













# **ANNUAL REPORT**

## **1956-57**

### **PART. I**

**[From 1st June, 1956 to 31st May, 1957]**



**UNIVERSITY OF CALCUTTA**



# CONTENTS

	Page
Centenary Celebrations	... 1
Honorary Degrees	... 6
Felicitations	... 6
Condolence	... 7
Good Wishes and Congratulations	... 7
Members of the Senate	... 7
Administration	... 8
University Professors	... 8
Professors and Lecturers Invited and Activities Abroad	... 9
Special Lecturers and Readers Appointed	... 9
Extension Lecturers	... 10
Special Medals and Prizes	... 11
Research Scholarships and Fellowships, etc.	... 11
Research Degrees	... 13
Research Activities	... 16
Endowments and Gifts	... 18
Changes in the Regulations	... 19
Committees	... 19
Delegates and Representatives	... 19
Government Grants	... 20
Equivalence of Examinations	... 21
Important Decisions	... 22
Affiliated Colleges	... 22
Financial Position	... 25
Asutosh Museum of Indian Art	... 28
Department of Education	... 32
University Halls and Hostels	... 33
University Library	... 35
Board of Health and Students' Welfare	... 42
Appointments and Information Board and Students' Advisory Bureau (Overseas)	... 44

	Page
Sports Board	... 47
Calcutta Review	... 48
Examinations	... 49
Department of Journalism	... 53
University College of Law	... 53
University College of Medicine	... 54
Calcutta University Press	... 56
Appendix A (Constitution of the Syndicate)	... 58
„ B „ „ Senate	... 62
„ C „ „ Academic Council	... 63
„ D „ „ Faculties	... 66
„ E Changes in the Regulations	... 70
„ F Research Activities of the Post-Graduate	
Departments	... 190
„ G Committees	... 227
„ H Delegates and Representatives	... 237
„ I Examinations	... 239
„ J Establishment List	... 298

# **ANNUAL REPORT**

**1956-57**

## **Centenary Celebrations**

The most outstanding event of the current session is the Celebration of the Centenary of the University.

On the completion of hundred years of its existence, the University of Calcutta commemorated its centenary in a suitable manner. All the Universities in India and about 300 Universities in other parts of the world were invited to attend the centenary celebrations which continued for seven days from 18th to 24th January, 1957. Besides, a large number of learned bodies and Institutions both in India and abroad were also requested to send their representatives to the Centenary Celebrations. The Indian Science Congress and the Inter University Board of India on special invitation held their annual sessions at Calcutta under the auspices of the University. The Indian Science Congress held their 44th session at Calcutta from January 14 to 21 and the Inter University Board of India held their 32nd Annual meeting on the 21st January, 1957. An exhibition was arranged under the joint auspices of the University and the Indian Science Congress which was opened by Sri Satischandria Ghosh, Mayor of Calcutta (also the Treasurer of the University) on 14th January, 1957. On this occasion the University has published a 'History of the Calcutta University' for the last 100 years of its existence edited by eminent scholars. Messrs. Sree Saraswaty Press Ltd., who printed the book got the first prize at the All India Printers Conference and Exhibition at New Delhi for the "fine printing and get up" of the volume.

The University decided to launch a number of development projects on the occasion of the centenary, one of them

being construction of a multi-storeyed building. The University also decided to start post-graduate teaching in Medical Sciences which had so long been done in affiliated colleges. Dr. B. C. Ray, Chief Minister of West Bengal, and ex-Vice-Chancellor laid the foundation stone of the multi-storeyed building and performed the inauguration ceremony of the University College of Medicine.

On the 19th January, the University held its centenary Convocation at 35, Ballygunj Circular Road, Calcutta. Sri C. D. Deshmukh, Chairman of the University Grants Commission addressed the Convocation as Chief guest.

On the 20th January, 1957, the Centenary Celebrations of the University were inaugurated at the Brigade Parade Ground. Dr. Rajendra Prasad, President of India presided.

The authorities of the University, Principals of all affiliated colleges, teachers of colleges in Calcutta, members of the Diplomatic corps in Calcutta, Government officials, members of the Legislative Assembly, Legislative Council, Councillors of the Calcutta Corporation, the Judges of the High Court and the Small Causes Court, leading citizens of Calcutta were present. A large number of representatives of Universities in India and abroad also attended the function on special invitation.

The Chancellor of the University offered her greetings to the guests in eloquent address.

A large number of messages of goodwill were received from the Universities of other learned bodies and Institutions invited to attend the celebrations. Sri K. G. Saiyiddin, Secretary to the Government of India, Ministry of Education, read a message from Maulana Abul Kalam Azad, Union Minister for Education. The Vice-Chancellor Sri N. K. Sidhanta, then read a message of goodwill received from the British Academy on behalf of Dr. S. Radhakrishnan, Vice-President of India, who had been requested to read the message on behalf of British Academy but could not attend the celebrations on the day owing to unavoidable reasons. The messages from the following Universities were then read by their representatives who

had come from overseas to attend the Centenary Celebrations :—

Name of the University	Name of the Representative
1. Buffallo University ...	Mr. Claude E. Puffer.
2. Amoy and other Chinese Universities.	Mr. Wang Ya Nan.
3. Birmingham University	Mr. R. S. Aitkin.
4. Bordeaux University ...	Prof. Piechand.
5. California University ...	Dr. Marion A. Wanger.
6. Cambridge University ...	Sir Harold Spencer Jones.
7. Catholic University of America.	Rev. R. W. Timm.
8. Ceylon University ...	Mr. N. Attygale.
9. Exeter University ...	Dr. J. W. Cook.
10. Gold Coast University	Dr. J. C. de Craft Johnson.
11. Hong Kong University	Mr. L. T. Ride.
12. Hebrew University of Jerusalem.	Prof. Lex Meyer.
13. Indiana University ...	Prof. W. H. C. Laves.
14. Khartoum University ...	Prof. Mekki Shebeika
15. Laval University ...	Mgr. A. M. Parent.
16. London University ...	Dr. D. W. Logan.
17. Makerere College ...	Mr. Bernard de Buneen.
18. Oxford University ...	Mr. N. C. Wright.
19. Newzealand University	Dr. J. F. Foster.
20. Pennsylvania University	Dr. W. Norman Brown.
21. Princeton University ...	Mr. A. F. Buddington.
22. Rochester University ...	Dr. Ralph G. Victor.
23. Rangoon University ...	Prof. Po Tha.
24. Western Ontario University.	Dr. G. E. Hall.
25. Budapest University ...	Prof. Lengyel.
26. Mary University ...	Dr. Dato Haji Mohammed Eusoff.
27. American Council of Education.	Mr. Francis J. Brown.
28. Association of the Universities of British Commonwealth.	Dr. J. F. Foster.

In making the function a success, the University received the hearty cooperation of the publicity Department of the Government of West Bengal and the Police Department.



On 21st January, 1957, the Inter University Board of India held their 32nd Annual meeting at Calcutta under the auspices of the University.

On the 22nd January, 1957, a symposium on University Education was arranged at 35, Ballygunj Circular Road. Teachers of all affiliated Colleges in Calcutta, members of the different authorities of the University and representatives of the different Universities were present on the occasion.

The opening ceremony of the Viharilal College was performed the same day at Hastings House compound, Alipore.

An Inter University debate was also arranged at 35, Ballygunj Circular Road. Students from almost all the Universities in India participated in the debate. Sri Sailakumar Mukherjee, Speaker of the West Bengal Legislative Assembly presided. The subject for the debate was "In the opinion of the House India's progress since the attainment of Independence has been satisfactory." At the conclusion of the debate, prizes were distributed—one running trophy to the winning University—one miniature trophy given away to the winning University—a Gold medal as the first prize, a Gold-centred medal as second prize and a silver medal as third prize.

A Special Convocation of the Senate was held on the 23rd January, 1957, at 35, Ballygunj Circular Road, Calcutta and Honorary Degrees were conferred on persons distinguished in the different walks of life. Dr. S. Radhakrishnan, Vice-President of India addressed the Convocation.

On 24th January, 1957, a march past and route march were arranged by the students of affiliated colleges. Students from different colleges assembled at the I.T.A. pavilion ground with their college flags and festoons as also the University flag under the guidance of teachers. The N. C. C. boys and girls from different colleges led by the N. C. C. Officers of the colleges concerned as also non-N. C. C. boys and girls took part in the function.

The Chancellor of the University took the salute from the N. C. C. contingents. Then the N. C. C. and non-N. C. C. boys and girls proceeded on a route march. Each college had its own banner and the University flag in front

of its Unit. The N. C. C. contingents were followed by the non-N. C. C. boys and girls. After marching through the different streets the procession came in front of the Senate House where the Vice-Chancellor took the Salute. Sweets were distributed among the boys and girls participating in the route march.

The celebrations ended on the 24th January, 1957.

It is gratifying to note that a large number of people enrolled themselves as Centenary Benefactors, Donors, Members etc. and a sum of about two lacs and twenty thousand was received by the University as endowments or donations and some presents were also received from some of the Universities invited on the occasion.

On this august occasion Centenary bonus equivalent to one month's basic pay was paid to all employees (excluding teachers) drawing a basic pay up to Rs. 350 per month.

### *Entertainments*

As a part of the celebrations, entertainment functions were also arranged from 19th January, 1957 to 24th January, 1957.

On the 19th the University Youth Festival Contingent presented a variety performance at 35, Ballygunge Circular Road.

On the 20th, the Children's Little Theatre presented a dance-drama "MITUA."

On the 21st Tagore's "RAKTAKARABI" was staged by "Bahurupee" the well known artists of Calcutta.

On the 22nd the employees of the University staged Tagore's "VISARJAN" at the University Institute. On the same day Tagore's "FALGUNI" was staged by Paschim Banga Sanskriti Parishad at 35, Ballygunge Circular Road.

On the 23rd, a variety performance of classical music was held by reputed artists of Calcutta at 35, Ballygunge Circular Road.

On the 24th, the students of the University staged the Sanskrit drama "MUDRA RAKSHAM" at 35, Ballygunge Circular Road.

A Centenary Supplement will be published within a short time.

*Honorary Degrees*—Doctorate degrees in different Faculties were conferred *Honoris Causa* on the following distinguished alumni of Universities, Indian and abroad, on the occasion of the Centenary celebration at a special Convocation held on 23rd January, 1957 on the ground that they were, by reason of their eminent position and attainments, fit and proper persons to receive such degrees:—

D.Litt.

Acharyya Nandalal Bose (In absentia)  
 Sri Rajsekhar Bose Do.  
 Dr. Zakir Hussain  
 Pandit Bidhusekhar Sastri  
 Pandit Jogendranath Tarkavedantatirtha  
 Prof. Arnold Joseph Toynbee (In absentia)

D.Sc.

Prof. Satyendranath Bose  
 Dr. Lloyd Viel Berkner  
 Sri Chintaman Dwarkanath Deshmukh  
 Dr. Jnanendrachandra Ghosh  
 Sir Harold Spencer Jones  
 Dr. Tosio Katagawa (In absentia)  
 Dr. Kariamanikkam Srinivasa Krishnan  
 Prof. Prasantachandra Mahalanabis  
 Dr. Arcot Lakshmanaswami Mudaliar  
 Academician Alexander Nikolaevich Nesmeyanov  
 Dr. John Robert Oppenheimer (In absentia)

LL.D.

Justice Sri Sudhiranjan Das  
 Sri Atulchandra Gupta

*Felicitations*—Felicitations were offered to Prof. Satyendranath Bose, M.Sc. on his appointment as Vice-Chancellor of the Visva-Bharati University. The Vice-Chancellor and Syndicate appreciated the eminent services rendered by Prof. Bose to this University and to science and regretted that the University would lose his services.

Felicitations were offered to Sri Chapalakanta Bhattacharyya on his election as a member of the Lok Sabha.

Appreciation of services rendered by Dr. Parimal Roy, M.A., Ph.D., Director of Public Instruction, West Bengal, as a member of the Senate, the Academic Council and the Syndicate was placed on record.

*Condolence*—The Syndicate condoled the death of Dr. Indubhusan Banerjee, Asstosh Professor of Mediaeval and Modern Indian History and a member of the Senate. The Syndicate also condoled the death of Sri M. N. Bose, a former member of the Senate and the Syndicate and Dean of the Faculty of Medicine and ex-Principal of the R. G. Kar Medical College, Calcutta.

*Good wishes and Congratulations*—Congratulations were offered to Justice Sri Ramaprasad Mookerjee for his elevation to the position of the Chief Justice of the High Court of Calcutta.

A message of goodwill was sent to the President, International Congress for Teaching Educational Sciences in Universities, Belgium, wishing success to its Second Congress held in Florence.

A message of goodwill was sent to the Rector and the Council of the University of Caen on the invitation of the Rector to this University for participating in the inauguration of the Building of that University.

Congratulations were offered to the Chief Editor, Editors and Printers of "One hundred years of the University of Calcutta" on its being adjudged at the Fifth session of the All-India Printers' Conference and Exhibition, as the best printed book for the year 1956.

Good wishes were conveyed to the Principa', University College of Rhodesia and Nyassaland, on the occasion of the installation ceremony of the Queen Mother as the President of the College.

A message of good wishes was sent to the President, XVth International Congress of Psychology, Brussels.

*Members of the Senate*—The following persons became ex-officio Members of the Senate during the period under review :—

- (1) Prof. Sarojkumar Basu, M.A., Ph.D.
- (2) Dr. Sushilkumar De, M.A., Ph.D.
- (3) Dr. Surendranath Sen, M.A., Ph.D., D.Litt.
- (4) Dr. Pareschandra Bhattacharyya, D.Sc.
- (5) Prof. A. K. Sengupta, D.Sc., A.M.I.E.E.

- (6) Prof. Makhanlal Raychaudhuri, M.A., LL.B., D.Litt., Sastri.
- (7) Prof. J. N. Bhar, D.Sc.
- (8) Prof. J. L. Bhaduri, D.Sc. (Edin.), F.N.I., F.A.S., F.Z.S.I.
- (9) Prof. Sisirkumar Mitra, D.Sc., F.N.I.

The undermentioned persons have ceased to be members of the Senate on account of cessation of their qualifications by virtue of which they became members of the Senate :—

- (1) Lt. Col. Amarendra Chakrabarti, M.Sc. (Cal.), M.A. (Cantab.) (ceased to be the Principal, Midnapur College).
- (2) Sri Someswarprasad Mukhopadhyay, M.A., LL.B. (ceased to be the Principal, Asutosh College).
- (3) Sri Prabodhchandra Sanyal, M.A. (ceased to be the Principal, Burdwan Raj College).
- (4) Sri Susobhanchandra Sarkar, M.A. (Cal. and Oxon.) (retired from Professorship).
- (5) Sri Matilal Pan, M.B., L.R.C.P., F.R.C.S.E. (membership ceased from September, 1956).
- (6) Dr. Bijanbihari Bhattacharyya, M.A., D.Phil., M.L.C. (membership expired on 4th September, 1956).
- (7) Sri Sajnikanta Das (membership ceased from June, 1956).
- (8) Dr. Jnanendranath Mukherjee, D.Sc., F.N.I. (ceased to be the Administrator, Board of Secondary Education, West Bengal).
- (9) Dr. Parimal Ray, M.A., Ph.D. (Lond.) (ceased to be the Director of Public Instruction, West Bengal).

*Administration*—Sri Satischandra Ghosh, M.A. was appointed Treasurer of the University for a further period of three years from the date of the expiry of the present term of appointment, i.e., from 1st February, 1957.

The term of appointment of Dr. Nareschandra Roy, M.A., Ph.D., Controller of Examinations was extended for a further period of one year with effect from 1st June, 1957.

Sri Arunkumar Roy, M.Sc. was confirmed in his post as Deputy Controller of Examinations with effect from 3rd July, 1956.

Dr. Bijoybhushan Banerjee, M.A., D.Phil. was confirmed in his post as Assistant Controller of Examinations with effect from 1st August, 1956.

Sri Sudhindrakrishna Dutt, M.A. (Oxon.), Barrister-at-Law, was appointed part-time Law-Officer with effect from 1st April, 1957.

Sri P. K. Banerjee, M.Sc., M.B.B.S., Secretary, Council of the University College of Medicine, was confirmed in his post with effect from 16th March, 1957.

*University Professors*—Dr. Makhanlal Raychaudhuri, M.A., LL.B., D.Litt., Sastri, was appointed University Professor of Islamic History and Culture with effect from 10th March, 1957.

Dr. Sashibhusan Dasgupta, M.A., Ph.D., was confirmed in his appointment as Ramtanu Lahiri Professor of Bengali Language and Literature with effect from 11th April, 1957.

Dr. J. N. Bhar, D.Sc., was appointed Sir Rashbehary Ghose Professor of Physics for seven years with effect from 27th April, 1957.

Dr. Anantakumar Sengupta, D.Sc. was appointed Sir Rashbehary Ghose Professor of Applied Physics for seven years with effect from 27th April, 1957.

Dr. Basantidulal Nagchaudhuri M.Sc., Ph.D., was appointed Sir Taraknath Palit Professor of Physics with effect from 27th April, 1957.

*Professors and Lecturers invited abroad and their activities*--Professor K. P. Chattopadhyay, M.Sc. (Cantab.), was invited to U.S.A. by the National Academy of Science, National Research Council, Washington, as a member of Exchange Visitor Programme. Professor Chattopadhyay was also invited to attend the Fifth International Congress of Anthropological and Ethnological Sciences held in Philadelphia, as a member of their Permanent Council and as a Delegate of the University of Calcutta.

Professor S. P. Chatterjee, M.Sc., Ph.D., T.D., D.Litt., was invited to Rumania by the President, Rumanian Institute for Cultural Relations with Foreign Countries to get himself acquainted with the activities of cultural institutions of the country.

*Special Lecturers and Readers appointed*—Dr. S. B. Dutt, M.A., Ph.D., Barrister-at-Law, was appointed Prof. Benoykumar Sarker Lecturer for 1956 to deliver at least two lectures on Money-Banking.

Sri Tripurari Chakrabarti, M.A., was appointed Adhar-chandra Mookerjee Lecturer for 1956.

Sri Binay Ghosh, M.A., was appointed Vidyasagar Lecturer for 1956 to deliver a course of at least two lectures in Bengali on some aspect of the life and work of Vidyasagar.

Sri Bimalchandra Sinha, M.A., was appointed Vidyasagar Lecturer for 1957 to deliver a course of lectures in Bengali on the various aspects of the life and work of Vidyasagar.

Prof. Basantidulal Nagchaudhuri, M.Sc., Ph.D., was appointed Adharchandra Mookerjee Lecturer for 1955 *vice* Prof. P. C. Mahanti (the original lecturer) deceased.

Dr. Hemchandra Ray, M.A., Ph.D., was appointed Raghunathprasad Nopany Lecturer for 1956 to deliver a course of lectures on the past glories of Rajasthan.

Dr. C. G. Pandit, M.B.B.S., Ph.D., D.P.H., D.T.M., F.N.I., was appointed Lady Brahmachari Reader in Medicine for 1957 to deliver a course of three lectures on a subject connected with medicine.

Swami Tejasananda was appointed Sister Nivedita Lecturer for 1956 to deliver a course of at least two lectures on the life and activities of Sister Nivedita.

Prof. Syed Hasan Askari was appointed Sir Abdullah Subrawardy Lecturer for 1956 in place of Mr. A. A. A. Fyzee, to deliver three lectures on some aspect of Islamic Thought and Culture.

Prof. Appadorai, Director, Indian School of International Studies, New Delhi, was appointed Honorary Taraprasad Khaitan Lecturer for 1956.

Dr. Subodhchandra Sen Gupta, M.A., Ph.D., was appointed Saratchandra Chatterjee Memorial Lecturer for 1956.

Dr. Sunilkumar Sen, M.Sc., D Phil., was appointed Tarinicharan Sur Reader in Nuclear Physics with effect from 9th February, 1957,

Sm. Aparna Devi was appointed Lila Lecturer for 1957 to deliver at least three lectures in Bengali on some subject of Bengali Language and Literature.

Sri Gopal Halder, M.A., was appointed Principal Khudiram Basu Lecturer for 1957 to deliver one or more lectures on a subject to be chosen by him.

Dr. S. N. Sen was appointed Dr. Syamaprasad Mookerjee Scholar for 1956 to deliver a course of lectures on "Hindu Culture and its working to improve better relations between Hindusthan and Pakistan."

*Extension Lecturers*—Sri Girijaprasanna Raychaudhuri was invited to deliver a course of six lectures on "Sri Chaitanya and his Companions."

Prof. C. D. Darlington of the University of Oxford was invited to deliver lectures and to conduct Seminars at this University for the benefit of the post-graduate students in Biology.

Prof. Franco Lombardi, Italian Philosopher was invited to deliver lectures on Philosophy and he was offered hospitality during his stay in Calcutta.

Dr. R. Schoder, Director of the University Frauenklinik, Leipzig, was invited to deliver lectures on obstetric and gynaecological problem.

Prof. George Catlin, visiting Professor of McGill University, was invited to deliver lectures during his stay in Calcutta on way to Japan.

#### *Special Medals and Prizes—*

*Sarojini Basu Medal for 1956* was awarded to Sri Sajani-kanta Das, B Sc. and the medal for 1957 was awarded to Dr. Bimanbihari Majumdar.

*Coates Medal for 1954* was awarded to Dr. C. L. Mukherjee for his outstanding contributions to medical science.

*Bhubanmohini Dasi Gold Medal for 1956* was awarded to Sm. Sita Devi for her original contributions to letters in the Bengali Language.

*Dr. D. N. Chakrabarti Silver Medal for 1955* was awarded to U/O Sushil Sabharwal, being the best all-round cadet of the 2nd Bengal Battalion, N. C. C.

*Rameschandra Dutt Prize for 1956* was awarded to Dr. Amala Tripathi, M.A., A.M., Ph.D. for his book "Trade and Finance in the Bengal Presidency, 1793-1833."

*Sir Asutosh Mookerjee Anthropology Prize for 1956* was awarded to Khaja Abdur Razaq.

#### *Research Scholarships, Fellowships etc.—*

*Kalyankumar Mukherjee Research Scholarship for 1956* was awarded to Sm. Maya Bandyopadhyay, M Sc to carry on research on "The Role of Vitamin B 12 and Pteroyl glutamic acid in Protein metabolism."



*Jnanendramohan Sen Scholarships for 1956* were awarded to each of the following candidates to carry on research on the subjects noted against each :—

Scholar	Subject of research
1. Sri Kamalkumar Chattopadhyay	A study of the problem of retardation (Scholastic backwardness) among students of Class VI in Secondary Schools in Calcutta.
2. Sri Tulsicharan Ghoshal	... Evolution of Curriculum in Secondary Schools of Bengal.

*Sarala Sen Scholarship for 1956* was awarded to Sm. Manjaree Dasgupta to carry on research on "An Experimental Study on word association test for Secondary School children."

*Dr. Kamal Krishna Raha Scholarship for 1956* was awarded to Sri Amalnarayan Datta for prosecution of his studies in Ground Engineering in the College of Aeronautical Services, Dum Dum Air Port.

*Ramcharan Mitra Scholarships for 1956* were awarded to the following candidates with a view to enabling them to prosecute their studies in the subject noted against each :—

Scholar	Subject
1. Sri Sudhansujyoti Datta	... Civil Engineering in Indian Institute of Technology, Kharagpur.
2. Sri Dipakranjan Nag	... Metallurgy in Jadavpur Polytechnic Institute.
3. Sri Sibakumar Pal	... Mining at Raniganj.

*Radhikamohan Educational Scholarship for 1956* was awarded to Sri Akhilranjan Chakrabarti, B.Sc. (Ag.) in order to enable him to prosecute the Diploma Course in Agriculture at the Cambridge University.

*Bangabala Mookerjee Scholarship for Higher Training in Nursing for the year 1956* was awarded to Sm. Radha Ray.

*Sudhir Coomar Mookerjee Scholarship for 1957* was awarded to Cadet P. B. Chaudhuri of the Sainik School, Dehra Dun.

*Darbhanga Research Scholarship for 1956* was awarded to Sri Arunkumar Raychaudhuri to carry on research work in Psychology of Cancer patients.

*The term of Fellowship of Mr. Yasuaki Nara, Bipradas Pal Chaudhuri Fellow for 1955, was extended by one year with a view to enabling him to complete his present research work.*

*Research Degrees*—The undermentioned scholars were admitted to the various Research Degrees on the recommendation of the Examiners of their theses as mentioned against each.

Name of the candidate	Title of the thesis
<i>D.Litt.</i>	
Sri Debiprasad Pal	... State sovereignty at the crossroads (an analysis of the reality and pretension of its majesty in International Society).
<i>D.Sc.</i>	
Sri Arunkumar Sarma	... Chromosome structure and constitution of materialistic and adult nuclei of vegetatively and sexually reproductive plants.
Sri Asimbikas Ray	... Oxyfluoride complexes
Sri Sukumar Basu	... Studies on the active principles of Apocynaceous plants.
Sri Ganes Karmakar	... Studies on Carotenoids and Vitamin A
<i>D.Phil. (Science)</i>	
Sri Sailendusekhar Mukherjee	... A generalised mechanism of lipid metabolism with special reference to cholesterol synthesis
Sri Anathjiban Bhattacharyya	... Synthesis of Polynuclear Compound with fused cyclopentane ring.
Sri Abraham Mathai	... Some techniques of Planning Sampling investigations in Statistical quality control and sample surveys.
Sm. Anima Chaudhuri	... Studies in Indian Rutaceae.
Sri Sankarlal Basu	... A study of Urinogenital system of Salientia.
Sri Satyendranath Banerjee	... The dissociation of some aliphatic monocarboxylates of bivalent metals in aqueous solution and S-methyl thiowrea sulphate as an analytical re-agent.
Sri Durgadas Ganguli	... Studies on the diseases of rice in India
Sri Santibrata Ghosh	... Studies on Physico-Chemical properties of Hides, tanned and untanned.
Sri Subrata Ganguli	... Microbial synthesis of Vitamin B 12 and Riboflavin.
Sri Bijaykumar Ganguli	... Synthetic experiments in Friedel-Crafts reaction and other synthetic studies.

- Sri Sadhirkanta Dasgupta ... Studies on the functions of liver and of the adrenal cortex in some diseased conditions.
- Sri Kuruvilla George ... Studies on the weeds of West Bengal and their control measures with special reference to their Ecology, Physiology, Morphology and Anatomy.
- Sri Nirmalkumar Chakrabarti ... On Certain aspects of Helminthosporium disease of paddy with particular reference to conditions in West Bengal.
- Sm. Purnima Sengupta ... X-Rays and differential thermal analysis of Indian clays.
- Sri Jnanendragopal Chakrabarti ... Studies on some problems of Equilibrium and Vibrations of Aeolotropic Elastic bodies.
- Sri Vangipuram Seshachar Ramachandran. Studies on differential thermal analysis of solid Catalysts.
- Sri Jogabrata Ray ... On some problems of multivariate analysis.
- Sri Radhagobina Laha ... On characterization of probability distributions and statistics from specified scholastic relations.
- Sri Sudhamay Ghosh ... Synthesis of Microbiological studies of some antimetabolites of folic acid.
- Sri Narendralal Datta ... Chemical examination of some poisonous plants.
- Sri Amareswar Chatterjee ... Synthesis of fused ring system
- Sri Rameshchandra Chatterjee ... Investigations on Polycyclic ring compounds.
- Sri Diptikumar Chattoraj ... Studies on the stability and electrokinetic potential of colloids.
- Sri Susilkumar Chaudhuri ... Investigation on the structure of jute fibre and its derivatives with the help of X-Rays.
- Sm. Krishnasudha Rohatgi ... Role of ascorbic acid on the metabolism of protein in monkeys.
- Sri Debajitkumar Biswas ... Studies on the nutritional status of the students.
- Dr. K. H. Buschmann ... Some aspects of the Economic Geography of India and Northern Europe.
- Sri Biswanath Dasgupta ... Structure of Aegelin.
- Sri Sarojranjan Chakrabarti ... Constitutive Studies of some Indian seeds fats rich in unsaturation.
- Sri Radharaman Basak ... Studies on the metabolism and biosynthesis of nicotinic acid by Rhesus Monkeys.
- Sri Purnendramohan Ray ... On some combinatorial problems in the design of experiments
- Sri Amal Chatterjee ... Physico-chemical and Ion-Exchange characteristics of concentrated suspensions of clays and resins.
- Sri Sibnarayan Chakrabarti ... Physico-chemical studies on soil fertility.

- Sri Lalitmohan Ray ... Studies on the performance and design of electrical machine.  
 Sri Ajitkumar Maiti ... Studies on the *Veronia Cinerea* (less) the indigenous herb of India.

*D.Phil. (Arts)*

- Sri Satchidananda Dhar ... A survey of the Avadana Literature with special reference to Sumagadhavadana from Indian and Tibetan sources.  
 Sri Kaliprasad Biswas ... Folk life and culture of Rangpur (based on the local dialect of Bengali).  
 Sri Bratiindrakumar Sengupta ... A critique on the Vivarana School studies in some fundamental Advaitist theories.  
 Sri Mahinderkumar Jain ... Non-Newtonian Flow of Liquids.  
 Sri Sisirkumar Mitra ... The history of Candellas  
 Sri Sitanath Goswami ... The concept of reality in Vedanta—a study of self-consciousness and falsity.  
 Sri Bimalkanti Samaddar ... The influence of Kalidas on the poetry of Rabindranath.  
 Sri Gurudas Bhattacharyya ... Bangla Kavye Siva  
 Sri Pratapchandra Chunder ... Marriage and morals in the Kautilya Arthashastra.

*D.Phil. (Medical)*

- Sri Sudhindramohan Ghosh ... Mode of action of Pyrethrum on insects with Supplementary thesis of Pyrethrum in control of insects and therapeutic application of Pyrethrum.  
 Sri Amulyaratan Ray ... A study of the Pathology and Pathogenesis of primary pulmonary hypertension.  
 Sri Pratapchandra Sengupta ... A Cytochemical study of some parasitic protozoa.  
 Sri Amiyakumar Mukherjee ... Growth requirements of entamoeba Histolytica (Schaudian, 1903).  
 Sri Sachindranath Chaudhuri ... Studies on the mechanism of Bacteria Allergy.  
 Sri Subodhramjan Dasgupta ... The study of Pharmacological action of Chlorpromazine on the central nervous system with special reference to Hypothalamus.  
 Sri Bhupati Banerjee ... Studies on basal metabolic rate, some important Haematological and Biochemical aspects of blood and nutritional survey of the people of Assam.  
 Sri Sudbirkumar Gupta ... The therapeutic activity of some sulphones and sulfoxides in experimental tuberculosis of guinea-pigs.

*M.D.*

- Sri Rathindranath Ray ... Observations on Cooley's anaemia and Cooley's trait.  
 Sri Bhaskararama Raychaudhuri ... Studies on peptic ulcer (clinical and experimental).

Sri Asokkumar Chaudhuri	... A study of Adreno-cortical function and its value in the assessment of severity and prognosis in Diphtheria.
Sri Syamaikumar Sen	... Clinical and experimental studies in Tropical Eosinophilia.
	<i>M.S.</i>
Sri Prabhaskumar Biswas	... Investigations of etiology of curlings ulcer after burns with special reference to histamine in the formation of the ulcer.
Sri Dhrubakumar Sen	... Histochemical detection of Alkaline and Acid Phosphatase activity in normal and pathological prostates as an acid in the diagnosis.
Sri Biswaratan Mukherjee	... (1) Role of Vagus nerve in the production of asthma and role of vagotomy in the amelioration of the same (2) Differentiation and importance of the two vagi with regard to their actions. (3) A new extra pleural approach to the vagus from the back.
	<i>M.O.</i>
Sri Kshitindramohan Gun	... A study of placenta praevia
Sri Sambhunath Mukherjee	... Study of vaginal cytology in the evaluation of functional status in sterility in women.

*Research Activities*—Details regarding the researches made during the period under review by the teachers and students of the University Colleges are given in the Appendix.

*Endowments and Gifts*—A sum of £ 500 was received from Messrs. Peacock and Goddard, Executors to the Will of Sir William Ewart Greaves who bequeathed the said sum to this University in token of his gratitude for the kindness received during the time he was Vice Chancellor of this University.

A sum of Rs. 10,000 was offered by Sm. Sucharu Devi to perpetuate the memory of her father Brahmananda Keshubchandra Sen. Out of the income of the endowment, a lecture or a course of lectures on Comparative Religion by competent scholar would be arranged.

An offer of 3% (1986) Conversion Loan of the face value of Rs. 1,000 was accepted with thanks from Sri Sati-chandra Ghose for creating an endowment for the annual award of a silver medal to be called "W. C. Ghosh Medal" in memory of the deceased uncle of the donor. The medal would be awarded to the girl student who would obtain the highest number of marks in English Honours in the B.A. Examination.

Donation of Rs. 3,000 from Dr. Jadunath Sinha, M.A., Ph.D., for creation of an endowment for award of a gold medal in commemoration of his deceased wife Sunitimanjari Sinha was accepted.

A further sum of Rs. 7,000 was received from the Secretary, Vidyasagar Institute for raising the value of the honorarium attached to the Vidyasagar Lectureship from Rs. 300 to Rs. 500.

An offer of Rs. 1,000 received from Sri S. K. Mookerjee, Lecturer of English, Scottish Church College for the award of a silver medal in memory of his parents, the late Radhabenode Mukherjee and Sm. Ranibala Debi, was accepted with thanks.

An offer of Rs. 6,000 received from Sri Saraswati Press, Ltd., for the award of a stipend to a meritorious but poor student in the Fine Arts Group of the Ancient Indian History and Culture Course, was accepted with thanks.

A cheque for Rs. 7,500 received from the Oriental Gas Co., Ltd., for reserving one room permanently in Jadavpur Kumud Shankar Roy T. B. Hospital for students of this University was accepted with thanks.

A trophy (challenge shield) presented by Mrs. N. K. Ghosh in memory of her father late Rai Bahadur Manmathanath Bose, M.L.C. of Midnapur, to be awarded to the winners of the Inter-College Zonal Football Tournament, was accepted with thanks.

Proposal from Prof. Nalinaksha Datta for crediting all bills due to him as remuneration for examining answer-scripts, to the University poor students' fund, was accepted with thanks.

The following amounts were contributed by Prof. Nalinaksha Datta as a token of gratitude to the University :—

- (i) Rs. 1,000 for the University Centenary Fund.
- (ii) Rs. 800 every month from his salary since January, 1957 for maintaining a monthly stipend for a meritorious Post-Graduate student in Pali.

A cheque for Rs. 1,500 from the Indian Chemical Merchants Association for the creation of an endowment for award of a book-prize to the candidate who stands first in the

M.Sc.(Tech.), Part I Examination in Applied Chemistry, was accepted with thanks.

A sum of Rs. 12,200 was received from Mrs. A. Basu for creation of a monthly scholarship of Rs. 15 to be named after Dr. Premasundar Basu. The Scholarship is to be awarded to a boy for a period of two years who passed the final examination of the Secondary Board of Education in the first division and has joined a college for higher education. The amount was invested in 3% Government Securities.

A number of gifts of books, paintings, photographs, apparatus, wood and stone carvings, etc. were received from different Universities of People's Republic of China and those of Moscow.

A further sum of Rs. 600 contributed by Sri A. K. Ghosh, Secretary, Majumdar Farewell Committee, for creation of an endowment for the award of a medal or prize to commemorate the services of Dr. G. P. Majumdar was accepted with thanks.

The following sums contributed by different firms were received on the occasion of the Centenary Celebrations:—

Rs. 5,000 from Messrs. Burn & Co., Ltd.

Rs. 5,000 from Messrs. Martin Burn, Ltd.

Rs. 5,000 from Messrs. Indian Standard Wagon Co., Ltd.

Rs. 10,000 from Messrs. Indian Iron & Steel Co., Ltd.

A sum of Rs. 1,000 was also received from Sri Keshaveswar Bose on the occasion.

A sum of Rs. 21.129-1-0 was received from the Accountant-General, West Bengal, for adding to the corpus of the "Bangabala Mookerjee Endowment Fund for Higher Training in Nursing".

3% G. P. Notes of the face value of Rs. 5,000 donated by Dr. Nareschandra Ghose for creation of an endowment for awarding "Dr. Haren Mukherjee Memorial Debate Prize" were accepted with thanks.

3% G. P. Notes of the face value of Rs. 1,500 donated by Sri Nripendranath Gupta for creation of an endowment for awarding a gold-rimmed silver medal to be named after Professor Subaschandra Ray were accepted with thanks.

A cheque for Rs. 2,000 from Mrs. N. Sinha for awarding a Prize in the form of a book token in memory of Rai L. M. Chatterjee Bahadur was accepted with thanks.

A sum of Rs. 7,000 was received from Sri Susilkumar Dey, on the occasion of the Centenary Celebrations of the University for creation of an endowment for awarding a scholarship of Rs. 15 and a book-prize to be named after his father, late Atindranath Dey.

3% G. P. Notes of the face value of Rs. 12,000 were received with thanks from Sri Asit Chaudhuri, Managing Partner of Charu Chitra for creation of Cash Prize or Prizes to be named "Charu Chitra Award" for one or more original contributions on the artistic and technical progress of Indian Motion Pictures.

A sum of Rs. 100 each was received from the following examiners who reviewed theses for different Doctorate Degrees and credited to the funds mentioned against the name of each :—

Dr. M. A Tuve	...	Library Fund.
Dr. L. A. Underkofler	...	Poor Students' Fund.
Lt. General K. S. Thimayya		Army Welfare Fund.
Mr. L. Zechmeister	...	Poor Students' Fund.
Prof. Lloyd E. Rozeboom	...	Do.

*Changes in the Regulations*—Details of all the changes made in the existing Regulations or New Courses adopted are given in the Appendix.

*Committees*—As usual, the Syndicate appointed various small committees to go into the details of some matters placed before it so that the Syndicate might make decisions on consideration of the reports furnished by them. The constitution of each committee is given in the Appendix. The committees that have been able to finish their work have been marked with asterisks.

*Delegates and Representatives*—As in previous years, delegates and representatives were duly appointed by the University on various academic bodies and conferences.



held in India or elsewhere. Their names are printed in the Appendix.

*Government Grants*—A sum of Rs. 13,333 was sanctioned by the University Grants Commission for fundamental research work in the Department of Applied Chemistry.

An offer of Rs. 20 000 from the Secretary, University Grants Commission for the development of the workshops of the University was accepted with thanks.

A sum of Rs. 10,00,000 was sanctioned by the University Grants Commission as loan under the Second Five Year Plan for the construction of students' hostels.

Government grant of Rs. 50,000 for 1956-57 was received for distribution among colleges for purpose of library and laboratory expenses.

A sum of Rs. 1,40,000 was sanctioned by the University Grants Commission for the purchase of scientific equipment in implementation of the schemes under the Second Five Year Plan for the improvement and development of existing facilities for the Post-Graduate Training and Research in the departments of Physics, Chemistry, Geology, etc.

A sum of Rs. 6,25,000 was sanctioned by the University Grants Commission for the improvement of existing courses in Applied Chemistry, Applied Physics and Radio-Physics and Electronics with a view to enabling the University to convert the two-year courses into three-year courses.

A sum of Rs. 50,000 was received from the Secretary, University Grants Commission as grant-in-aid for the purchase of books and journals relating to the Humanities.

A sum of Rs. 50,000 was received from the University Grants Commission for purchase of books and journals other than the Humanities (Scientific and Technological subjects).

A sum of Rs. 14,000 was received from the Government to carry on Post-Graduate work in the Institute of Electronics and Radio-Physics.

A sum of Rs. 46,160 was sanctioned by the Government towards non-recurring expenditure for the extension of the Viharilal Training College.

A sum of Rs. 7 45,000 was received from the University Grants Commission out of Rs. 10 lakhs sanctioned for

payment as advance grant to this University for Centenary Celebrations. The balance of Rs. 2.55 lakhs would be paid later.

A sum of Rs. 7,78,358-12-0 which was previously advanced by the Government of West Bengal as loans to the University for different purposes, was converted into grant to enable the University to repay the loans advanced.

A sum of Rs. 1,00,000 was received from the University Grants Commission as grant for the construction of Post-Graduate Hostel.

A sum of Rs. 35,000 was received from the University Grants Commission as grant (2nd investment) for non-recurring expenditure for the Department of Economics.

A sum of Rs. 9,671-4-0 was sanctioned by the University Grants Commission for meeting personal allowances to teachers of the University.

A sum of Rs. 15,000 was sanctioned by the University Grants Commission for conducting research work in the Nepalese language to determine its origin and subsequent influence on it of Sanskrit and other Indian languages.

*Equivalence of Examinations*—During the period under review the following examinations of other Universities and Boards were recognised as equivalent to the corresponding examinations of this University :—

Name of University or Board	Name of Examinations	Equivalent to the Examination of this University
Ceylon University	B A.	B.A.
Travancore University	B.Com. , & M.B.B.S.	B.Com., & M.B.B.S.
Board of Secondary Education. M.P.	Secondary School certificate Examination	School Final of the Board of Secondary Education, West Bengal.
Rangoon University	I.Sc. & B.Sc.	I.Sc. & B.Sc.
Karnatak University	B.A., M.A. & Ph.D. in Arts. B.A., M.A., M.Ed., B.Com., Ph.D. in Social Science and Diploma Teaching, B.Sc., M.Sc., Ph.D. in Science, LL.B., LL.M. in Law. B.E. (Civil) in Engineering B.Sc. (Ag.) & M.Sc. (Ag.) in Agriculture.	Equivalent to the corresponding examinations of this University.
Ajmere Board	I.Sc. & Matric.	I.Sc. School Final Examination.

Utkal University	Technical Matric.	School Final
Government General Hospital, Madras	Diploma in Nursing	For admission to Dip-Diet course.
Andrews University, Scotland.	M.B.Ch.B.	For admission to D.M. & C.W. course
Banaras Hindu University	B.Sc. (Ag.), M.Sc. (Ag.)	B Sc. (Ag.) M.Sc. (Ag.)
Sardar Vallabhai Vidya-pith.	I.A., I.Sc., B.A., B.Sc. & B.E.	I.A., I.Sc., B.A. B.Sc., & B.E.
Agra University	M B B.S.	M.B.B.S.
Lahore University	M.B.B.S.	For admission to D.M. & C.W. course
General Conference of Seventh Class, Adventist Southern Asia Division, Burma.	High School Course	School Final Examination

*Important decision*—Affiliated Colleges were requested to start Text-book Banks to commemorate the Centenary of the University.

### Affiliated Colleges

During the period under review there were 123 colleges under the University—Arts and Science Colleges—104, Medical—9, Commerce—1, Agriculture—1, Tanning—1, Law—2, Engineering—1, and Training—4.

Under orders of the Vice-Chancellor and Syndicate, the following colleges were inspected and affiliation or extension of affiliation was granted.

1. School of Tropical Medicine ... Recognition as an affiliated institution for D.T.M. & H.
2. Garbeta College ... B.A. in certain subjects and Biology in I.Sc.  
Sri Chaitanya College, Habra (New). I.A. in certain subjects and I.Sc.
4. Maharaja Udaychand College for girls I.A. and B.A. in Mathematics
5. Dinhata College (New) ... I.A. in certain subjects
6. Institute of Post-graduate Medical Education and Research, Calcutta Recognition as an Institution for training for M.D., M.S., M.O. and D.Phil. (Med).
7. Seth Soorajmull Jalan Girls' College. I.A. in Commercial Geography
8. Taki Government College ... I.Sc. in Biology
9. Barasat Government College ... I.Sc. in Biology
10. All-India Institute of Hygiene and Public Health. D.Phil. in Certain subjects  
Sri Sikshayatan College ... I.A. in Geography and Botany  
B.A. in certain subjects.
12. Asutosh College, Calcutta ... B.Com. in French
13. Surendranath College, Calcutta ... B.Com. in French

14. Raja Peary Mohan College, Uttarpara I.A. in Alternative Bengali and Additional Paper in Alternative Bengali B.A. in Alternative Bengali and Bengali Pass.
15. Gokhale Memorial Girls' College... B.A. in certain subjects.
16. Manimala Girls' College, Asansol B.A. in certain subjects
17. Bolpur College ... B.A. in certain subjects
18. Barasat Government College ... B.A. in certain subjects
19. Lady Brabourne College, Calcutta. I.A. in Pali
20. Kandi Raj College ... B.A. in certain subjects
21. Ranaghat College ... B.A. in certain subjects
22. City College. South Calcutta Branch. Social Science for girls. Psychology and Anthropology to the I.A. and I.Sc. Standard
23. Jhargram Raj College ... B.A. in certain subjects
24. Taki Government College ... B.A. in certain subjects
25. J. K. College, Purulia ... I.A., I.Sc. and B.A. in certain subjects.
26. Rampurhat College ... B.A. in certain subjects
27. Hindu College, Gobardanga ... B.Sc. in Zoology and Botany, B.A. Honours in Bengali.
28. P. K. College, Contai ... B.A. Honours in Economics
29. St. Paul's Cathedral College, Calcutta. B.Sc. Honours in Physics, Chemistry and Mathematics
30. Raniganj College ... I.A. and I.Sc. in certain subjects, B.A. in certain subjects.
31. Goenka College of Commerce ... B.Com. in French
32. Dum Dum Motijheel College ... B.Sc. in Physics, Chemistry and Mathematics.
33. Vidyasagar College, Calcutta ... B.Sc. Honours in Botany
34. Victoria Institution, Calcutta ... I.A. and I.Sc. in Alternative English.
35. Barrackpore Rastraguru Surendranath College. ... B.A. in certain subjects
36. Seth Sooramull Jalan Girls' College. B.A. in certain subjects.
37. Maharaja Manindra Chandra College B.Sc. in Physics Chemistry and Mathematics,
38. Uluberia College ... B.A. in certain subjects
39. Maharajadhiraj Udaychand College I.Sc. in certain subjects.
40. Vijaynarayan Mahavidyalay Itachuna B.Sc. in certain subjects
41. Rishi Bankim Chandra College, Naihati. B.Sc. in certain subjects
42. Basirhat College ... B.A. in certain subjects
43. Kalna College ... B.Sc. in Physics, Chemistry and Mathematics.
44. Ramananda College, Vishnupur ... B.Sc. in Physics, Chemistry and Mathematics
- (45) St. Joseph's College, Darjeeling ... B.A. Honours in English and Economics, B.Sc. Honours in Chemistry.
- (46) Siliguri College ... B.A. in certain subjects.
- (47) Brahmananda Keshabchandra College, Bon-Hooghly. ... B.Sc. in Physics, Chemistry and Mathematics.
- (48) Sorojini Naidu Girls' College, Dum Dum. B.Sc. in Physics, Chemistry and Mathematics.

- (49) Dinabandhu Andrews College, B.Sc. in Physics, Chemistry and Mathematics.  
Baishnabghata.
- (50) Bengal Music College ... I.Mus. and B.Mus. in certain subjects.
- (51) Howrah Girls' College ... B.A. Honours in History.
- (52) Midnapur Women's College ... I.A. and I.Sc. and B.A. in certain subjects.
- (53) Sangit Bharati, Calcutta ... I.Mus. and B.Mus. in certain subjects.
- (54) Viharilal College of Home Science I.Sc., I.A., B.Sc. and B.A. in certain subjects.

The following colleges were inspected in connection with their application for extension of affiliation in different subjects, but their cases were not recommended :

- (1) South Calcutta Girls' College ... B.A. in certain subjects.
- (2) Dinabandhu Institution, Sibpur ... B.Sc. in certain subjects.
- (3) Vidyasagar College, Suri ... B.Sc. Honours in certain subjects.
- (4) Muralihar Girls' College, Calcutta ... I.A. and B.A. in certain subjects.
- (5) Charuchandra College, Calcutta ... B.A. Honours in Philosophy and B.Sc. in certain subjects.
- (6) Narasinha Datta College, Howrah ... B.A. Honours in certain subjects.
- (7) Serampore College ... B.A. Honours in Economics I.A. and B.A. Bengali and Honours in B.Sc. Chemistry.
- (8) Deshabandhu College for Girls, B.A. in certain subjects.

The following proposed colleges were inspected, but affiliation was not recommended, as the authorities were unable to fulfil the minimum requirements :

- (1) Syamaprasad College, Dhakuria ... I.A. in certain subjects.
- (2) Women's College, Krishnagar ... I.A. in certain subjects.

Under orders of the Vice-Chancellor and Syndicate special inspection was held of the following colleges :

- (1) Calcutta National Medical College ... Permission to admit excess number of students.
- (2) Charuchandra College, Calcutta ... Complaints.

Annual inspection of the following colleges was held during the period under review :

- (1) St. Xavier's College, Calcutta.
- (2) Burdwan Raj College.
- (3) Kandi Raj College.
- (4) Victoria Institution, Calcutta.
- (5) Calcutta Dental College.

The Inspector of Colleges utilised his visits to colleges applying for extension of affiliation to enquire fully into the working of such colleges and tendered necessary advice.

Dr. Bidhanchandra Roy Institute of Post-Graduate Medical Education and Research was recognised as an Institution for training of students for the degrees of M.D., M.S. M.O. and D.Phil. (Medicine) in Pathology from the session 1956-57.

### Financial Position

The Budget Estimates for the year 1956-57 showing a deficit of Rs. 6.92 lakhs were passed by the Senate on 25th June, 1955. The year 1956-57 opened with a debit balance of Rs. 7 lakhs and it was estimated that the accumulated deficit at the close of the year 1956-57 would come to Rs. 7.6 lakhs.

As per award of the Tribunal constituted under the Secondary Education Act, 1950, a sum of Rs. 5.52 lakhs per annum is payable by the Government of West Bengal to compensate the loss incurred by the University on account of Matriculation Examination. This amount as well as the statutory grant of 16 lakhs has been received from the Government of West Bengal.

The position at the close of the year would be more or less like—

	Rs.
Accumulated deficit as per Budget Estimates at the close of the year 1956-57.	7.63 lakhs.
Less receipt in excess of the Budget provision in major items.	5.87 „
Total deficit ...	<u>1.76 „</u>

This deficit is likely to be wiped out as substantial saving is expected.

Like previous years we received from the Reserve Bank of India a sum of Rs. 25000 for maintenance of the Professorship on Industrial Finance with two Research Assts. working under him.

There is a proposal for strengthening the Department of Economics with an estimated non-recurring expenditure of Rs. 9,00,000 inclusive of Rs. 3,00,000 for land. The recurring expenditure is estimated to be Rs. 1,80,000. The University proposes to meet 50% of the recurring expenditure from its own resources and has requested the University Grants Commission to meet the balance. The University Grants Commission has already made available Rs. 100,000 to the University towards non recurring grant. The Building is nearing completion.

The University celebrated its Centenary Celebration in January, 1957. The University Grants Commission has agreed to pay Rupees one crore being the contribution of

the Central Government to the University on the occasion of Centenary Celebration. Out of this commitment we have received Rs. 7.45 lakhs being the first instalment of grant. The Government of West Bengal, on the occasion of Centenary Celebration, has converted the loans given to University from time to time, into grants and thus no repayment will be required of the outstanding of loan and interest of Rs. 7,78,358-12-0. Also we have received Rs. 2.23 lakhs from private sources as Centenary contribution.

This year the University has revised the scales of pay of the Research Assistants, ministerial, technical and lower subordinate staff and others including the employees of the University Press. The revised grades are shown below :—

	Rs.
(1) Office Superintendent, P. A. to the Vice-Chancellor and Asst. Superintendent in the Press.	250-15-400.
(2) Office Assts., Technical Assts., Draftsman, Overseers, Mechanics, and others who are in the grade of Rs. 200-10-300 or Rs. 80-5-120-10-250.	100-10-210-E.B.-10-300-Sp. E B -15-330.
(3) Office Assts., Technical Assts., Mechanics, Drivers, Operators and others who are at present in the grade of Rs. 60-4-120-E B.-5-170 and Rs. 55-3-85-E.B.-4 125-5-180.	70-4 110-E B.-5 180
(4) Lower Subordinate Staff	... 35-1-50 and Rs. 40-1-60.
(5) Taxidermist, Plumber, Boiler Attendant, Jr. Laboratory Assts.	40-2 70-3-100.
(6) Research Assistants	... 150-15-330.
(7) Drawing Office Superintendent	... 150-10-330.
(8) Supervisor of Language Department	... 250-15-400.
(9) Press—	
Lino-type Operator	... 125-4-205-5 225.
Mono type Operator	125-4 205 5-225.
Mono-type Caster	55 3 118-4-130.
Thompson Operator	70-3-118 4 150.
Impositor	40-2-70-3 100.
Lino-type Attendant	40-1-60.
Compositor	70-3 118-4-150.
Distributor	70 3-118-4 150.
Machineman	55-3-118-4-130.
Inkman	50-1-68 2 80.
Binder	50-1-68-2 80.
Proof Pressman	35-1-40-2-60.
Cooly	30-1-35-2-45.

The expenditure for fixing the employees in the revised grade was Rs. 63,000.

The University has introduced an additional retirement benefit for its employees. According to the decision of the Senate, dated the 2nd June, 1956, all whole-time employees on retirement will be entitled to a contribution from the University which will be  $\frac{1}{2}$  month's pay for every completed year of service subject to a maximum of 15 months' pay or Rs. 7,200 whichever is less. This year the University has spent Rs. 68,000 on this account.

The University Grants Commission sanctioned Rs. 1,40,000 for purchase of scientific equipments for different departments of this University. According to the terms of grant the University is to spend Rs. 70,000 to provide matching grant.

As in previous years the Government of West Bengal sanctioned Rs. 50,000 for distribution to the selected colleges of West Bengal for purchasing books which has been accordingly done.

Two hostels for Post-Graduate students, one for man and another for woman, are under construction. The total estimate for these hostels is Rs. 9,24,000. The Government of India has agreed to grant Rs. 4,60,000 for these hostels. The University received Rs. 3,00,000 in previous year from the Government of India towards the first instalment of grant. Out of this amount Rs. 1,50,000 has been re-allotted by the Government to other schemes. The commitment of the Government of India, as aforesaid, however stands and the University has received from the Government a further grant of Rs. 100,000 during the year. From the Government of West Bengal we have received Rs. 4,28,135 for this purpose, out of which Rs. 3,41,135 has been given as interest-free loan and the balance in the form of land for hostel. The loan has however been converted into grant by the Government of West Bengal and hence no repayment will be required.

The construction of the College Buildings for the Home and Social Science at Hastings is in progress. It is now estimated that a sum of Rs. 11.54 lakhs will be required which includes cost of land and construction of building and equipments. The land at Hastings has been purchased at a cost of Rs. 3,00,000 from the State Government by selling the corpus of the V. L. Mitra Fund to the extent of Rs. 3,73,000 out of the total corpus of Rs. 6,56,700.



The Government of India have agreed to bear 66% of the actual cost of the buildings, which is estimated as Rs. 5.9 lakhs. The University received Rs. 50,000 from the Central Government towards the first instalment of the grant in the previous year.

### ASUTOSH MUSEUM OF INDIAN ART

The Asutosh Museum was enriched by 914 objects of art and antiquity mainly through exploration and collection and 114 excavated objects during the year under review.

*Exploration*—That Gangetic lower Bengal, bordering on the sea was dotted with numerous cities and ports in early historic period is clearly revealed by further intensive exploration carried out by the Asutosh Museum during the year, mainly in the districts of 24-Parganas and Midnapur. Besides the half a dozen sites explored in the last two years, this year's explorations were rewarded by the discovery of four more ancient sites, forming a sort of garland around Calcutta and within a radius of fifty miles or so. Exploration work at Chandraketugarh, Berachampa, the site of a large extensive city with rampart walls, which have been excavated by the Museum during the current year yielded surface finds of unusual interest, including an inscribed fragment of grey sandstone with Maurya polish, N.B.P. sherds fragments of stamped and rouletted pottery, some obviously of Roman origin, terra-cotta tablets and figurines betraying marked Hellenistic influence in drapery, coiffure and footwear, large number of beads of semi-precious stones in various stages of manufacture and more than fifty silver punch-marked coins. Among other terra-cotta finds special mention may be made of the upper part of a Yaksini, reminiscent of the Maurya terra cotta figurines of Pataliputra and Tamralipti in style and elaborate headdress, Apsaras under an embellished parasol and attended by cranes, warriors, a square tablet with rhinoceros motif, a rattle in the form of a seated male figure, several inscribed seals and varieties of Mithuna couples, human and animal, belonging to the Sunga-Kushan-Gupta period.

From Harinarayanpur, another pre-Christian port on the main channel of the Ganga near Diamond Harbour, have been recovered about seventy copper-cast coins, two bearing extremely rare symbols of a ship and a camel, rouletted

ware, terra-cotta sculptures of c. 1st. cent. B.C.—5th cent. A.D. of various types and workmanship, two heads showing an elongated headgear with Egyptian affinity. A newly discovered site Deulpota, in the vicinity, has yielded Sunga terra-cotta Yaksinis recalling those from Harinarayanpur. From Atghara in 24-Parganas, close to the bed of the Adi-Ganga and only 12 miles south of Calcutta, another new site explored by Sri P. C. Dasgupta, Assistant Curator of the Museum, a collection of antiquities analogous to those of Tamralipti, Chandraketugarh, Harinarayanpur, etc. A unique small round gold coin of 6.25 grains bearing hitherto unknown devices on the one side and an antelope under a wheel on the other has also been recovered from Tamluk. Terra-cotta figurines of Kushan, Gupta and early mediaeval times have been collected as a result of exploration of Bahiri in the Midnapur district.

*Excavation*—An excavation party under the guidance of Sri K. G. Goswami, M.A., Excavation Officer, which also included some Post-Graduate students, carried on a trial digging on a selected part of the mound of Chandraketugarh, 24-Parganas, for two weeks in March, 1957. The excavation was rewarded by the find of the evidences of several stages of human habitation of different periods beginning with the Maurya-Sunga age down to the post-Gupta period. Even the existence of a pre-Maurya level is warranted by the finds of peculiar pottery.

The site seems to be very promising and it is desirable that the University should undertake further excavations there in future on a larger scale. In this connection it may be mentioned that the Government of India has provided a matching grant of Rs. 5,000 to assist the University in carrying on archaeological excavations.

*Collection*—Of the stone sculptures acquired through collection mention may be made of a finely executed Visnu panel of reddish sandstone from Sanchra, District Burdwan of c 7th century A.D., several large sandstone sculptures representing Jaina Tirthankara, notably a miniature replica in basalt of a Sikhara temple, containing four niches with inscribed images of standing Tirthankaras of the 10th—11th century A.D. A smaller Jaina stone carving of Adinath of about the same age was secured from Mayta in Midnapur.

district. A rare seated Buddha image of Bronze from Maynamati was made over to this Museum. A fairly large gilt figure of seated Tara, from Nepal c. 15th cent. A.D. donated by Mr. N. H. Austen of New York, is another notable addition to the Museum which has been further enriched by the representative collections secured by the Curator from Orissa which comprised artistic and historical objects of different phases and category including interesting bronze images of the 13th and 16th centuries and late mediaeval illustrated palm-leaf manuscripts on temple architecture of Orissa, besides examples of folk-art. Both Mayta and Sanchra which have been proved to be Pala sites have been explored by Sri M. K. Pal, Research Scholar of the Museum.

*Coins*—270 coins, mainly acquired through gift were made up of 1 gold unidentified, 50 silver punch-marked, 42 copper-cast, one of Soter Megus, 2 silver alloy of Mihirkula, 21 Chinese of the 10th—12th centuries, 1 Balinese besides mediaeval Hindu and Muslim coins.

*Paintings*—Among the 250 paintings added to the Museum, through purchase, mention may be made of several outstanding specimens of the Rajasthani school, including a new style; dated Nepalese and Tibetan Tankas of the 16th and 18th centuries, Rajasthani Madhumalati and Malati-Madhava manuscript, dated 1740 A.D., temple hangings of the Bundi and Nathadwar schools including one showing a European courtier and a lady, old Jaina painted banner from Gujerat, representing types of Bengal and Orissan Pats as well as several late mediaeval Bengali and Orissan illustrated manuscripts on paper and palm-leaf.

*Exhibition*—The Museum had also held two exhibitions—one specially organised on the occasion of the International Museum Week of October, 1956 and the large comprehensive Centenary exhibition in the second half of January, 1957. The Joint Exhibition of the Calcutta University Centenary Celebrations and the 44th Indian Science Congress Association held simultaneously at the Senate Hall and Asutosh Buildings, of which the Museum exhibits formed an integral part, showed the progress and development of education and specially University education in India during the last 100 years, both in Arts and Science,

with the help of charts, models, maps, instruments, books, flags and crests and other objects of visual appeal. The Museum had also lent outstanding Buddhist sculptures and paintings to the Buddha Jayanti Exhibition organised by the Lalit Kala Academy and objects of folk-art and terra-cottas to the All-India Handloom Board in connection with the Textile Exhibition at Venice.

*Preservation and Cleaning*—The Preservation Section cleaned many coins, terra-cottas as well as sculptures in bronze, copper and an old ivory box in advanced stages of decomposition and decay.

*Art Appreciation Course*—The Teachers' Training Certificate Course in Art Appreciation was held in the Museum during the months of May-August, 1956. Eight students were admitted and passed—five with distinction.

*Museology*—A notable event in the year under review was the decision by the University to start a Diploma Course in Museology, a two years Post-Graduate Course in Museum technique and administration, for which the necessary Regulations have been passed. Arrangements are being made to commence classes in November, 1957, under the auspices of the Museum and in co-operation with the Indian Museum, University Colleges of Arts and Science and other institutions.

*Other Activities*—The Curator, Sri D. P. Ghosh, M.A., presided over the All India Museums Conference held at Agra in December, 1956, and simultaneously attended the 19th Session of the Indian History Congress as a delegate of the Museum. He has also been appointed a member of the Standing Committee of the Central Museums Advisory Committee as well as the Central Museums Advisory Board by the Government of India.

*Visitors*—During the period more than 20,000 visited the Museum including those who visited the Centenary Exhibitions. Among the distinguished visitors mention may be made of Prof. Gordon Childe, Dr. Robert Bradlow, President, Royal College of Dental Surgery, England, Tatsu Morito, President, University of Hiroshima, Prince Dhannivat, President, Siam Society, Dr. C. D. Deshmukh, Chairman, University Grants Commission, Prof. W. Norman Brown of the University of Pennsylvania, Nicholas Attygalle Vice-Chancellor, Ceylon University, H. M.

**Eusoff**, Vice-Chancellor, University of Malay, **Prof. L. A. Mayer** of the University of Jerusalem, **J. A. Pope**, Director, Freer Gallery of Art, Washington, **Prof. J. P. Galestin**, of the University of Amsterdam and **Ellsworth Bunker**, Ambassador to the United States.

### **Department of Education and Teachers' Training Department**

**Sri K. K. Mookerjee**, Head of the Departments of Education and Teachers' Training presided over the Teachers' Training Section of the XXXI All-India Educational Conference held at Jaipur in October, 1956. He delivered his presidential address on "Reorientation of Teacher Education in India" which was later published in the *Journal of Education* (Vol. IV, No. 2). Sri Mookerjee was delegated by the University as one of its representatives to attend a regional conference of five Indian Universities on "General Education" held at this University in April, 1957, to discuss the question of introduction of General Education in Indian Universities. He also attended a conference of Principals of Teachers' Training Colleges in India held at Bangalore in May, 1957, under the joint auspices of the Ministry of Education, Government of India and the All-India Council for Secondary Education, New Delhi, for revision of the syllabii at the B.Ed level and for reviewing the work of the Extension Services Departments of some Training Colleges. Sri Mookerjee acted as the Recorder of the general sessions of the conference, and one of his reports has already been published in the 'Teacher Education' (Vol. I, No 5), an official organ of the All India Council for Secondary Education. The two research assistants under the Government of India Scheme 'Research Problems connected with Secondary Education' have been working under him.

**Sri M. C. Ghosh** has been working on 'Studies in Educational Sociology.' He has published the following papers during the current year; (i) Social Studies for our School (The Teachers' Quarterly, September, 1956), (ii) Structural Changes in Human Society (The Journal of Education, Vol. IV, No. 3), (iii) The Roles of Conflict and Co-operation in Society (The Calcutta Review, March, 1957).

Sri Bhujangabhusan Bhattacharyya has published a book in Bengali on 'Rabindranath and his Educational Philosophy.'

During the year various kinds of co-curricular activities were organised by the Department, such as debates, literary discussions, seminars, study circles, games and sports, and so on. Excursions were undertaken to places of educational and cultural interest.

Some extension lectures were arranged for students and members of the staff. Among those who spoke the following may be mentioned :—

(a) Mr. P. J. Pitman, the great grandson of Sir Isaac Pitman of the Central College, London. (Training of Teachers for Commercial Courses).

(b) Sri K. Bose (Home-Work).

(c) Sri Induchandra Chatterjee (The Impact between Indian Culture and Occidental Culture).

### University Halls and Hostels

1. The number of Halls and Hostels remain the same as last year

2. *New Halls and Hostels*—The construction of the Post Graduate Lady students Hall at Hastings House Compound is nearing completion. It is expected that the Hostel may be started from September, 1957. The construction of the Post-Graduate men students Hall at Hazra Road is in progress.

It has been decided to start a Hostel both for Post-Graduate and Under-Graduate lady students at premises No. 45, Beniatola Lane, as soon as it will be vacated by the V. I. Mitra Domestic Science Institute in August or September, 1957.

3. *Grant-in-aid to Non-Collegiate Hostels*—The University pays annually Rs. 600 as grant in-aid to Sree Sarada Asram for better management of the Hostel. During the year a sum of Rs. 1,000 was paid to the Asram.

4. *Concession in Seat rent*—(a) Usual concessions were granted to deserving boarders on the recommendation of the authorities of the Halls and Hostel concerned, and (b) usual stipends were also paid to deserving students belonging to the Scheduled Caste Community residing in the

approved hostels for which a sum of Rs. 2,800 has been provided in the Budget.

5. *Inspection*—All the Halls and Hostels were inspected by the Board of Health and the University Engineer. The University Inspectress of Halls and Hostels for Lady students also visited every month the lady students Halls and Hostels and also at such other times as and when required.

6. *Licence*—Licences were renewed and granted as the case may be to non-collegiate Hostels in the City, 13 in number, having accommodation for 800 students including 71 lady students for the session in 1955-56. There are also a number of collegiate Hostels under the direct control of the Governing Bodies of the respective colleges with accommodation for about 2,700 students including 360 women students. The University has no financial relation with these Hostels.

7. *Management of the University Halls and Hostels*—For the general supervision of the University Halls and Hostels there is in each Hall and Hostel a Supervising staff consisting of Superintendent, Assistant Superintendent, Steward or matron and a number of menial staff to help the boarders. The boarders get free—medical aid and are helped to build a corporate life in the Halls and Hostels. The boarders themselves make arrangements for their own messing in the Hall in accordance with the rules framed by the University. The general health of the boarders is reported to be good.

8. *Demand for seats*—The number of post-Graduate Students in Arts and Commerce, Science and Technology is about 3,800 and we have hostel accommodation for 254 in Post-Graduate Men students Halls and for 74 in Post-Graduate Lady students Halls. When the Hostels at Hazra Road and Hastings House compound will be ready for occupation we shall have 180 seats more—100 for Post-Graduate men students and 80 for Post-Graduate Lady students.

For want of suitable Hall we had to refuse several application for hostel accommodation of foreign students reading in this University.

During summer and Puja holidays parties of students from different Universities of India, who visit Calcutta

on educational purpose, are accommodated in the Hostels as far as practicable.

For about 50,000 Under-Graduate students in Calcutta there is hostel accommodation for only 3,999 boys and 483 girls as detailed below :—

	Boys	Girls
(1) Under-Graduate Hostels run by the University	930	52
(2) " " " " run by the Governing Bodies of the respective Colleges,	2310	360
(3) University Licensed Hostels run by private parties.	729	71

### University Library

*Accommodation*—The problem of accommodation in the University Central Library remained practically unsolved during the year 1956-57. The University authorities ultimately decided to demolish the present Senate House and build a multistoried building there, the idea being to allot a separate block of the building to the Library. The foundation stone of the proposed building was laid by Dr. B. C. Roy, the Chief Minister of West Bengal on the occasion of Centenary Celebrations of the University in January, 1957.

The number of seats provided for readers in the Library, at times, proved inadequate. Demand for seats by Research students, Research Scholars and University teachers is also ever increasing and the number of seats kept reserved for them is proving absolutely inadequate to meet the demand.

*Administration*—There was no change in the administrative set up during the year. Shri Susantakumar Sengupta, Assistant Librarian was confirmed in his post with effect from 1st February, 1957.

The volume, variety and complexity of work in the library having increased enormously in recent years, the Librarian demanded additional staff to cope with the work and the demand was scrutinised by a Committee appointed by the Library Committee. The Committee was convinced that the demand of the Librarian was not unjustified. But they held that unless and until the problem of accommodation was solved the staff necessary for the Library could not be employed. They, however, recommended provision of a staff of 24 more persons in different grades in the meantime as an interim measure.



**Appointment of three temporary assistants** was sanctioned for three months to cope with the additional work in connection with the purchase of books out of a grant of Rs. 1,00,000 received from the U.G.C. for the purpose.

**Library hours**—As usual the Library remained open from 7 A.M. to 9 P.M. on week days and from 12 noon to 4 P.M. on Sunday all the days in the year except University holidays. During the Pujah holidays the Reading Room was kept open from 1 P.M. to 8 P.M. daily for 16 days.

**Accession and gift**—Total addition to the stock of the University Library during the year 1956-57 was 10,270 vols. as against 8,464 vols. in the previous year. The above figure of course does not include the number of bound volumes of periodicals. Apart from the usual library budget grant of Rs. 70,000 for books and periodicals a grant of Rs. 1,00,000 was received from the University Grants Commission for the purchase of books and journals during the year. Of this grant a sum of Rs. 50,000 was meant for the purchase of books pertaining to Humanities and an equal amount for books and journals for Science and technological subjects.

Late Dr. H. C. Mukherjee, Chancellor of the University, who died during the year under review, bequeathed his private collection of 704 volumes of books and pamphlets to the University Library.

Out of the total vols. added, 1,721 vols. were received as presentation and 71 vols. on exchange of University publications against 3,385 and 76 vols. respectively in the previous year. During the year an offer of books and journals worth 25,000.00 was received under U.S.A. India Wheat Loan Educational Exchange Programme and requisite requisitions for books and journals for the said amount were despatched to the U.S.A. Wheat Loan Office at New Delhi in prescribed forms.

Besides the gifts received from late Dr. H. C. Mookerjee as previously mentioned the Library received other gifts from various individuals and institutions, both Indian and foreign.

**Classification of Cataloguing**—The normal practice of classifying most of the new accessions according to the Dewey Decimal System and books in Sanskrit and Bengali as well as old serials and Government publications, etc.

according to the old scheme of classification was continued. The usual card catalogue for all publications classified and catalogued during the year was maintained besides the book form of catalogue for books classified according to the old scheme. Altogether 3,524 vols. of publications were classified and catalogued during the year against 3,712 in the previous year and 12,080 cards were prepared for the catalogue.

During the year under review Dr. S. C. Sengupta looked through portion of the proof of the Catalogue of the P. C. Ghosh collection.

A list of the MSS. in different languages numbering 226 kept in the steel almirah of the Central Library was prepared in cards.

*Periodical*—The number of periodicals received in the Library during the year 1956-57 was 816 against 743 in the year 1955-56. Of 816 periodicals 706 were subscribed whereas the number of periodicals subscribed in the previous year was 643. Some 110 journals have been received from various sources as gift or on exchange, the number under the same head in the previous year being 109.

Of the 706 periodicals subscribed 407 were distributed to the various departments of Science and Technology against 374 in the previous year and 299 were retained in the Central Library against 250 in 1955-56.

*Library Cards*—The number of cards issued to the readers of various categories during the year was 6,199 against 6,297 in the previous year. Of the total cards issued 2,894 cards were issued for the Lending Section against 3,056 in 1956-57. Total number of Library deposit refund applications disposed of during the year was 824 against 919 in the previous year.

*Library Bulletin*—Eleven issues, one of which covered additions of two months, of the Library Bulletin giving list of new additions to the Central Library month by month were brought out during the year under review against 12 issues in the previous year.

*Library Committee*—Prof. Nikhilranjan Sen was appointed a member of the Library Committee in place of Prof. Satyendranath Bose under section 2 (4) of the First

### Statutes and Ordinances to the Maintenance and Management of the University Library.

Four meetings of the Library Committee were held in the year 1956-57 against 6 in the previous year.

*Book Binding*—2,676 vols. of books and periodicals were bound at a cost of Rs. 5,058.50 nP. during the year, the corresponding figures for the previous year being 2,102 vols. and Rs. 4,102 respectively. Of the volumes bound 2,508 belonged to the Central Library and 168 to the departmental libraries. Total cost of the binding of books of the departmental libraries was—Rs. 382.89 nP. as against Rs. 612.62 nP. in the previous year.

*Book Issue*—During the period under review the number of books and periodicals issued in the Reference Section was 2,54,348 against 2,53,712 in the previous year.

*Information Service*—Information service was maintained in the Library as before and information relating to bibliographical matters and various topics was supplied as usual to the members of the Library and other Departments of the University as well as to scholars, individuals, other libraries, Universities, Cultural, Scientific and learned societies and institutions, etc. whenever such information was sought.

*Inter-Library Loan*—Under the usual inter library loan system the Department borrowed 32 books and other materials from other libraries and institutions, both Indian and foreign against 22 items in the previous year and it lent 99 vols. of books to other libraries and institutions against 112 in the previous year.

*Departmental and Seminar Libraries*—Reports on the working of only 11 Departmental and Seminar libraries out of 17 were received for the period under review. Statistics relating to these libraries is given in the appendix.

*Professional Activities and Achievements of the Staff*—During the year under review Sri P. C. Bose, the Librarian contributed several articles on librarianship and library movement to various journals, was re-elected President of the Bengal Library Association, inaugurated the 11th Bengal Library Conference held in Purulia in April, 1957 and served as a member of Selection Committee for appoint-

ment of some librarians under the Education Directorate, Government of West Bengal.

Sri S. K. Mookerjee, Deputy Librarian, Central Library contributed technical articles to several journals. A book in Bengali on library science written by him was, it is reported, handed over to a local publisher for publication and was under print when the year elapsed. He also served as an expert in interviews for the selection of the librarians in the Indian Museum and in the Library of the Archaeological Survey of India, Eastern Circle at the request of the respective Superintendents of the establishments.

A book in Bengali under the title 'Janasadharaner Granthagare Pustak Nirvachan' by Sri Rajkumar Mukherjee of the Catalogue Section of the Central Library was published by a local publisher during the year 1956-57.

*Visitors*—The Library was visited by a large number of distinguished persons, both Indian and foreign throughout the year. Many of the foreign guests who attended the Centenary celebrations of the University visited the Central Library.

*Library Exhibition*—A separate stall with exhibits from the University Central Library was set up in the University Centenary Exhibition held in January, 1957 which was visited by a large number of persons.

*Librarianship Training Department*—Three meetings of the Librarianship Training Committee were held during the year 1956-57. 40 students were admitted to the course for the session 1956-57 out of 358 applications received. The number of applications received in the previous year was 150. The question of Degree course in Librarianship was under consideration of the Academic Council during the year.

## APPENDIX

### STATISTICS RELATING TO THE DEPARTMENTAL AND THE SEMINAR LIBRARIES OF THE CALCUTTA UNIVERSITY

For The Year 1956-57

	Botany	Geology	Applied Chemistry	Psychology	Zoology	Applied Physics	Physiology	Education & Teachers' Training	Anthropology	Radiophysics	Geography
Number of books issued for reference inside the Library.	586	213	2,500	721	405	4,686	Not recorded.	125	2,321	2,610	450
Total number of books lent out to borrowers of all categories.	636	1,053	6,100	1,126	402	2,060	409	...	486	2,049	2,300
No of students using the library.	59	34	116	82	60	106	50	230	57	60	33
No. of Readers other than University students using the library.	21	10	50	9	15	50	30	...	...	22	6
Number of books added to the Library during the period :											
(a) by purchase	110	170	225	161	42	339	70	377	157	188	317
(b) by presentation	1	7	25	...	2	3	...	...	33	18	50

Number of periodicals  
received in the library  
during the period :

(a) by subscription	14	...	45	31	18	29	18	28	17	26	69
(b) by presentation or exchange.	12	...	20	...	16	28	...	71	...	23	...

Total number of books  
and bound Vols. of  
Periodicals in the  
Library on 31st May,  
1957.

1,863

3,390

...

3,474

3,746

3,018

1,394

665

4,289

2,373

2,373

1,394

3,018

Number and Particulars  
of the Library staff of  
the department.

1 Junior  
Lib.  
Asst.

1 Lt.  
bearer,  
1 Lib.  
Asst.,  
1 bearer.

1 Lib. Managed  
Asst. by Lib.  
staff- rian,  
1 lit.  
bearer.

No Lib  
staff.

1 Teacher,  
1 bearer.

Office  
Asst.,

1 Lib. No Lib.  
Asst., staff  
1 lit.  
bearer.

### Board of Health and Students' Welfare

During the period under review the Board of Health organised various Youth Welfare activities in addition to its normal works. The following were the main activities organised by the Board :—

1. *Medical Examination of Students*—During the period 1st June, 1956 to 31st May, 1957, the Medical Examiners attached to the Board of Health carried out routine periodical examinations of 3447 (Male—3131 ; Female—316) 1st, 3rd-, and 5th-year students of 9 different institutions affiliated to the University, the woman students being examined by the Lady Medical Examiner.

Each student examined was supplied with a copy of his or her medical examination report. Besides, special attention was drawn of 400 students to their defects or diseases requiring immediate medical attention, requesting them either to present themselves before the After-care officer attached to the Board of Health or to their family physician for advice or treatment.

Reports on the findings of the medical examinations at each institution were drawn up and were forwarded to the Principals of the institutions concerned.

2. *After-care and Follow-up Work*—(i) 1218 dark-room examinations of vision were carried out at the Eye-clinic attached to the Board of Health of students suffering from defective vision. Arrangements were made with different optical firms for supply of 331 pairs of glasses at concession rates. 26 pairs of glasses were given free to indigent students on the recommendation of the Principals concerned, the cost being borne by the University.

(ii) Facilities for treatment of dental diseases at concession rates were extended to 13 students by previous arrangements with a Dental Practitioner.

(iii) 84 students requiring hospitalisation were admitted to the Students' Infirmary attached to the R. G. Kar Medical College Hospital for treatment and 29 students were referred to the different Out-doors of the same hospital for investigation and treatment.

(v) Arrangements for X-ray, blood and sputum examinations were made in case of 7 students to come to a proper diagnosis, the cost being borne by the University.

143 students were examined and treated by the After-care officer for their defects or diseases.

*Inter-University Youth Festival*—With a view to raising a contingent from the Calcutta University to the III Inter-University Youth Festival, 1956, the Board of Health in co-operation with the Academy of Dance, Drama and Music, Government of West Bengal and AIR organised Inter-Collegiate Competitions in different items of Arts, Dance, Drama, Music, Radio Play and Hindi Elocution. 400 students from 26 college units participated in the Festival. A Contingent of 53 members (Male students—26 ; Lady students—19 ; teachers—4 and accompanists—4) participated in the III Inter-University Youth Festival, 1956, held in New Delhi from 23rd October to 30th October, 1956. The Calcutta University Contingent won 7 awards at the Festival in Handicrafts, Painting, Drama, Instrumental Music (Male & Female), Group Singing and Radio Play.

*Labour and Social Service Camp*—The Ministry of Education sanctioned 9 Labour and Social Service Camps for 1956 of which 8 could only be organised by different institutions. 4 such camps were held during the latter part of summer holidays and 4 during Puja holidays. One of these camps was for woman students from different colleges in Calcutta. 544 students and teachers participated in the activities of these camps. They rendered valuable services to the villagers by building and repairing roads, cleaning tanks, organising adult education and recreational centres and various other works connected with the reconstruction of the villages.

Arrangements were made with the N. C. C. authorities to accommodate 100 non-cadet students from various colleges in Calcutta to the Labour and Social Service Camps for cadets at Bolepur held during the period 4th to 17th May, 1957.

*Apprenticeship Training in Village Development to Selected University*—Under the above scheme the Ministry of Education, Government of India sanctioned 130 apprenticeships (117 students and 13 teachers) for the Calcutta University for 1956-57. Out of 430 applications received from students and teachers, the Board of Health interviewed 156 applicants and selected 130 including 13



teachers. The selected candidates were grouped in three batches and the first batch of selected apprentices joined the Training Centre for training and service on 10th May, 1957 for a period of six weeks.

*Youth Leadership Training and Dramatics Camp*—Under the scheme to train selected members of the staff of colleges in the art of dramatics which will enable them to promote those cultural activities in the educational institutions, the Ministry of Education, Government of India, requested Calcutta University to depute 4 members of the staff from affiliated colleges to the camps organised for the purpose by the Centre, at Matheran (Bombay). The Board nominated 4 teachers from different colleges to undergo training at the Dramatics Camp. at Matheran held from 13th May, 1957 for 3 weeks.

*Inspection of Halls and Hostels*—The Board inspected 4 Hostels during the period under review on the general sanitary conditions of the kitchens, dining rooms and students' canteens and submitted its reports to the Syndicate.

*Calcutta University Rifle Clubs*—The affiliation of the Calcutta University Rifle Clubs with the West Bengal Rifle Association was maintained by the Board and arrangements are being made to revive the activities of the Clubs.

### **Appointments and Information Board and Students' Advisory Bureau (Overseas)**

After amalgamation of the two departments with added responsibilities, this joint organisation has now three sections :—

- (a) Appointments Service.
- (b) Advisory Services.
- (c) Information Service.

*Appointments Service*—The essential function of this service is to secure employment for University trained (various faculties) students and to arrange practical training facilities in every field of employment besides providing advice and guidance on careers. The Board is always in touch with potential employers and maintains Registers for qualified candidates and makes recommendations after interviewing candidates to firms when requested.

**Advisory Services**—This section gives advice to students at any time during and after their University course, and others on all matters relating to employment, careers, etc. This service also offers advice and information to University students and the public alike regarding facilities available for higher studies and research in various faculties and for practical training overseas and to secure for them in conjunction with our foreign offices, admission to academic and professional institutions and facilities for practical training in industrial and commercial firms.

**Information Service**—This service provides up-to-date information regarding various courses of studies offered by the different Indian Universities and technical instructions, various competitive examinations and other recruitments by Government and semi-Government Departments, etc. There is a Central information centre (enquiry) for the purpose of supplying information and assistance to the students and the public alike on matters concerning the Registrar's Department, the Department of the Controller of Examinations, etc. It supplies, in particular, informations concerning studies and examinations of this University.

The Board's services are being very more widely used now than ever before and the students are looking to the Secretary for guidance on careers.

During the period under review the Board recommended 126 candidates to 29 organisations for various posts including Executives, Engineers, Labour Officers, Chemists, etc. The Board also recommended pay scale for Engineer-Trainees to a British concern.

As for recruitment of Traffic Probationers (Shipping) under the Port Commissioners, a special committee was formed. Of a large number of applicants, 62 were called for interview and 22 were recommended.

167 applications were received for registration of names with the Board as given below :—

Arts Graduates including M.A.s.	... 31
Science Graduates including M.Sc.s.	... 43
Commerce Graduates including M.Com.s.	... 33
Engineering Graduates	... 31
Medical Graduates	... 2
Journalists	... 9
Under-Graduates	... 18

In the registers there are also Ph.D., M.Tech., and others with specialised education/training.

Visits are being made to firms after issuing circular letters or by appointment on the telephone.

All the four chambers of Commerce were contacted and they have all issued circulars to all their member firms. Acquaintance with more than fifty firms has been done already and they have expressed their willingness to support our Board.

During the period under review 388 applications were received by the Students' Advisory Bureau (Overseas) for studies and/or training abroad and offers of admission were secured on behalf of 137 students.

The average number of enquiries received varies between 25 and 30 per day and the nature of enquiries is classified as follows:—

U.K.	... (a) Post-Graduate Course in Medicine (D.C.H., F.R.C.S., D.C.P, M.R.C.O.G, M.R.C.P., D.M.R.D. & T., etc.). (b) Education. (c) Engineering and Technology. (d) Bar.-at-Law. (e) Management Studies (Business Management), Personnel Management, Industrial Administration, Labour Relations and Welfare, etc.). (f) Post-Graduate Course in Agronomy, Bio-Chemistry, Taxonomy, Electronics, etc. (g) Degree Courses in Science, Agriculture, Social Sciences, Economics and Commerce, etc. (h) Doctorate degrees in various subjects (i) Diploma in Jute Technology, Printing, Librarianship, etc. (j) Professional qualifications such as Salesmanship, Publicity, Banking, Costing, Secretaryship, Insurance, Journalism, etc.
U.S.A.	Business Administration, Social Sciences, Chemical Engineering, Paper Technology, Journalism, Doctorate degrees in various fields, etc.
Australia	Agriculture, General Studies.

Germany	... Training in works (Steel Industry, Machine Tool, etc.) Textiles, Fuel Technology, Agriculture, Doctorate degrees in Science subjects, e c.
Japan	... Textiles, Fisheries.
Vienna	... Post-Graduate Course in Medicine.

### **Sports Board**

The greatest achievements of the Calcutta University Sports Board during the year are (a) the Victory of the Calcutta University Football team in All-India Inter-Varsity Football Final, 1956, which is regarded as the Blue riband of the Inter-Varsity Tournaments and (b) the successful staging of the Centenary Sports in collaboration with the Centenary Sports Committee.

*Inter-Collegiate and Inter-Varsity Games*—The Football season started from the 2nd week of July, 1956. 28 colleges participated in the league, they were divided into four groups. The league championship was concluded on 30th September, 1956. Calcutta University participated in the Inter-Varsity Football tournament held at Banaras and won the All India Championship. Seven colleges participated in the Inter-Collegiate Swimming competition held in the Azad Hind Bag on 20th, 21st and 22nd September, 1956.

Calcutta University Swimming and Waterpolo team participated at the Inter-University Championship held at Bombay and was the runners-up in Swimming and Waterpolo.

Calcutta University Volleyball team participated in the Inter-University tournament held at Allahabad.

Inter-Collegiate Cricket League was held and twenty-five colleges participated. Cricket knock-out tournament was restricted to six group champions of the League.

Inter-Collegiate Tennis tournament was held in February, 1957. Five colleges participated. Arrangements were made for Tennis coaching at the University Lawns for six weeks. Calcutta University participated in the Inter-University Tennis tournament held at Patna and was beaten by Delhi in the North Zone final.

Athletic trials were held in order to select Calcutta University team for the Inter-University Athletic Championship.

Calcutta participated in the Inter-University Athletic Championship held at Calcutta under the auspices of the Board. Inter-Collegiate Athletic Championship was held in January as part of the Centenary Sports programme.

Twenty-two colleges participated in the League and knock-out Hockey tournaments. Calcutta University participated in the Inter-University Hockey Tournament and lost to Banaras Hindu University.

*Zonal Football Tournaments*--As in the previous year, for the benefit of the students reading in colleges situated outside Calcutta two Zonal football tournaments at Midnapore and Suri centres were held.

In the sphere of All-India Tournament also Calcutta University defeated Nagpur University in the final of the All-India Inter-Varsity Football Championship, 1956, at Banaras, and won the coveted Sir Syed Sultan Ahmed Cup and re-established its supremacy as the best University Football team of the year.

The Inter-Collegiate Regatta was held in the month of October, 1956.

The Calcutta University Rowing Club also participated in the Head of Lake Regatta.

The Monsoon Regatta in Fours was held in the month of July, 1956.

This year Calcutta University Rowing Club organised Inter-Varsity Regatta as a part of the Centenary Celebration of the University. Inter-Varsity boat races were held between Calcutta University, Rangoon University, Lucknow University and Jadavpur University in fours, pairs and Scull on 10th January, 1957.

During the Centenary Celebration of the Calcutta University, a special Regatta named 'Centenary Regatta' was held and every member of the club participated in this Regatta.

Calcutta University participated in A.R.A.E. Regatta at Colombo and lost to Karachi Boat Club in Fours.

The Centenary Celebrations included the following programme of Centenary Sports:—

1. XVth Inter-Varsity Athletics Championship.
2. Calcutta University XI Vs. Rangoon University (Football).
3. Inter-Varsity Regatta.
4. (Football)—Old Blues Vs. Rangoon University.
5. (Tennis)—Calcutta University Vs. Rangoon University.
6. Cricket—Professors XI Vs. Sports Journalists XI.
7. Cricket—Jadavpur University Vs. Calcutta University.
8. Professors' Cricket—Chairman's XI Vs. Vice-Chancellor's XI.
9. Centenary Regatta at the Dhakuria Lakes—Symposium on Sports and Games at the Rowing Club.

10. Athletics (Girls)—Inter-Collegiate.
11. Athletics (Boys) Inter-Collegiate.
12. Do.
13. Whole-day Sports Programme by the Students Sports Council of the Calcutta University.
14. Swimming and Waterpolo.
15. Cricket—Calcutta University Old Blues (Captain's Team) Vs. Calcutta University Cricket Team.

### **Calcutta Review**

The Calcutta Review is now running in its 37th year. Among the eminent writers of world-wide reputation and those who are well known in the domain of journalism in India and abroad who contributed their learned articles in the Review during the year may be mentioned: Dr. Edward Podolsky, Miss Indira Sarkar (Switzerland), W. de Vogel, Dr. P. S. Sastri, G. Ternival, Dr. W. Baring (Holland). Prof. W. F. Gay, Dr. J. P. Niyogy, Dr. V. J. Konigsburger, Sri Ahindra Chaudhury, Dr. J. N. Mahanty, Sri Hemendra Prasad Ghosh and others.

Judging from the variety and standard of articles which appeared in the Review during the year it may be well compared with any first rate periodical of the country. The most characteristic feature of the Journal is its sections on 'ourselves', 'Book Reviews' which prove immensely interesting to the student community as also to the general reading public. Particular issues of the review as the one on 2nd Five Year Planning were favourably noticed and highly spoken of by some of the influential weeklies and dailies throughout India and letters of good wishes received from several eminent writers testifying to the usefulness of the journal and the high standard it has all along been maintaining in the field of journalism. The Review is run by a Board of Editors consisting of ten distinguished scholars through a Manager.

About twenty quarterlies, forty monthlies, twenty weeklies and five dailies in English and Bengali are received in exchange of the Review. The more important of the periodicals are forwarded to the University Library after use in the office. The annual subscription of the papers and magazines received is estimated at about Rs. 700.

### **Examinations**

The following is a statement showing the number of students under different denominations appearing at the

Matriculation, Intermediate, B.A. and B.Sc. Examinations of this University in the years 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956 and 1957 :—

Male	Female	Hindus	Mahomedans	Christians	Other Religions
<b>Matriculation</b>					
<b>1949—(Total No. 33,730)</b>					
29,061	4,669	30,972	2,441	267	50
<b>1950—(Total No. 38,016)</b>					
32,522	5,494	35,156	2,164	256	14
<b>1950—Special—(Total No. 4,629)</b>					
4,135	494	3,944	669	10	6
<b>1951—(Total No. 28,533)</b>					
31,691	6,847	36,388	1,725	229	156
<b>1951—Special—(Total No. 889)</b>					
721	150	647	115	84	43
<b>I.A.</b>					
<b>1949—(Total No. 9,543)</b>					
7,175	2,068	8,922	511	80	31
<b>1950—(Total No. 8,021)</b>					
5,930	2,091	7,440	461	85	35
<b>1950 (Special July and August combined)</b>					
<b>(Total No. 3,343)</b>					
2,902	441	3,162	164	14	3
<b>1951—(Total No. 10,702)</b>					
8,032	2,670	10,168	373	103	58
<b>1952—(Total No. 8,843)</b>					
6,446	2,397	...	...	...	...
<b>1953—(Total No. 9,246)</b>					
7,202	2,744	...	...	...	...
<b>1954—(Total No. 11,734)</b>					
8,524	3,210	...	...	...	...
<b>1955—(Total No. 15,215)</b>					
11,315	3,900	...	...	...	...
<b>1956—(Total No. 21,716)</b>					
17,973	3,743	...	...	...	...
<b>1957—(Total No. 24,476)</b>					
18,586	5,890	...	...	...	...
<b>I.Sc.</b>					
<b>1949—(Total No. 10,242)</b>					
10,007	235	9,869	239	62	22

Male	Female	Hindus	Mahomedans	Christians	Other Religions
<b>1950—(Total No. 9,638)</b>					
9,332	306	9,246	316	45	31
<b>1950 Special—(July and August combined)</b>					
<b>(Total No. 4,342)</b>					
4,282	60	4,173	139	20	10
<b>1951—(Total No. 12,488)</b>					
12,068	417	12,033	286	95	71
<b>1952—(Total No. 10,738)</b>					
10,336	402	...	...	...	...
<b>1952—(Special August—41)</b>					
41	...	...	...	...	...
<b>1953—(Total No. 11,784)</b>					
11,339	445	...	...	...	...
<b>1954—(Total No. 12,904)</b>					
12,359	545	...	...	...	...
<b>1955—(Total No. 13,461)</b>					
12,919	542	...	...	...	...
<b>1956—(Total No. 15,097)</b>					
11,457	640	...	...	...	...
<b>1957—(Total No. 14,567)</b>					
13,718	819	...	...	...	...
<b>B.A</b>					
<b>1949—(Total No. 3,073)</b>					
2,201	872	2,798	226	39	11
<b>1950—(Total No. 3,333)</b>					
2,314	1,019	3,059	201	51	16
<b>1951—(Total No. 3,545)</b>					
2,506	1,440	3,749	195	46	11
<b>1952—(Total No. 3,569)</b>					
2,189	1,480	...	...	...	...



Male	Female	Hindus	Mahomedans	Christians	Other Religions
<b>1953—(Total No. 3,535)</b>					
2,291	1,244	...	...		
<b>1954—(Total No. 3,919)</b>					
2,445	1,474	...	...		
<b>1955—(Total No. 4,644)</b>					
3,005	1,644	...	...		
<b>1956—(Total No. 6,920)</b>					
4,465	2,455	...	...		
<b>1957—(Total No. 9,157)</b>					
6,983	2,174	...	...	...	...
<b>B.Sc.</b>					
<b>1949—(Total No. 2,481)</b>					
2,427	54	2,411	46	18	6
<b>1950—(Total No. 3,008)</b>					
2,942	66	2,918	64	19	7
<b>1951—(Total No. 3,601)</b>					
3,518	83	3,526	41	19	15
<b>1952—(Total No. 3,337)</b>					
3,216	121	...	...	...	...
<b>1953—(Total No. 3,867)</b>					
3,635	182	...	...	...	...
<b>1954—(Total No. 3,701)</b>					
3,512	189	...	...	...	...
<b>1955—(Total No. 4,056)</b>					
3,856	200	...	...	...	...
<b>1956—(Total No. 4,720)</b>					
4,493	227	...	...	...	...
<b>1957—(Total No. 5,559)</b>					
5,251	308	...	...	...	...

## Journalism

The present report of the department relates to the period from the 1st June, 1956 to the 31st May, 1957. The most important fact to be mentioned during this period is the constitution of the Faculty of Journalism. On the recommendation of the Standing Committee for Journalism, approved by the Syndicate and the Academic Council, the Senate had agreed to the creation of the Faculty of Journalism. The Academic Council at its meeting on the 11th September, 1956, considered the constitution of the Faculty and accepted the suggestion of the Secretary, Standing Committee for Journalism, that the Faculty should comprise both the Departments of Post-Graduate and Under-Graduate Studies in Journalism and that the number of its members should be 15. This was accepted by the Senate at its meeting on the 27th September, 1956, and the assent of the Chancellor was received on the 21st January, 1957.

It needs be mentioned here that the Board of Post-Graduate Studies for Journalism had been previously constituted.

The Standing Committee for Journalism was reconstituted for the period 1957-59.

## University College of Law

During the period under review, there was an increase in the roll strength of the College in comparison with the strength of the previous year. In 1956-57 the number of students on the rolls of the College was 2,023, while in the previous session it was 1,719. The tutorial staff consisted of the Principal, the Vice-Principal, thirty-two Lecturers and two Tutors. The post of the Principal which was a part-time one, was made wholetime from the beginning of the session 1956-57. Dr. B. N. Mukherjee, M.Sc. (Cal.), Ph D. (Lond), D.I.C., Barrister-at-Law, a Lecturer of this College, has been appointed whole time Vice-Principal of the College in the vacancy caused by the retirement of the former Vice-Principal Sri A. C. Karkoon, M.A., LL.B.

This College and its Library were visited by the following distinguished persons, both Indian and foreign, during the year 1956-57:—

- (1) Mr. H. C. L. Merrilat,  
Executive Associate of the Ford Foundation,  
U.S.A.
- (2) Mr. Carl B. Speath,  
Dean of the School of Law, Stanford University,  
California.
- (3) Mr. Justice Warren,  
Chief Justice of the Supreme Court of U.S.A. &  
Mrs. Warren.
- (4) Mr. Justice William Hastie,  
Judge, U.S.A.
- (5) Sri Chintamani Deshmukh,  
Chairman, University Grants Commission &  
Srimati Durgabai Deshmukh.

The College has introduced Post-Graduate Research Fellowships in legal studies over and above LL.M. scholarships.

The Library Reading Room remained open from 6-30 A.M. to 8 P.M. on all working days except on Saturdays when it closed at 5 P.M. The total number of books issued to the students in the Reference and the Lending Sections was 33,197.

During the year under review, the College Union, the College Athletic Club and the College Gymnasium gave a good account of their respective activities. The College Rowing Club won trophy in Inter-Collegiate Knockout Regatta.

Attached to the College is the Hardinge Hostel which has accommodation for about 160 boarders.

### **University College of Medicine**

This University College of Medicine was inaugurated by the Chief Minister of our State Dr. B. C. Roy, on 18th Januar

So long the University had a few Post-Graduate Diplomas and degrees and up till now it had played the part of an examining body without arranging for a regular

and well organised course for higher studies in Medicine. The Faculty of Medicine formulated the Statutes for establishing such college which was approved by the Academic Council and the Senate. The Statutes were framed after taking into consideration the Post-Graduate courses in Medicine of the U.S.A., U. K. and Vienna.

At the present moment there are medical colleges and institutions which give facilities to students for conducting Post-Graduate works. The University College of Medicine would at the initial stage turn in federating these institutions and co-ordinating in higher studies and researches in different medical subjects.

Post-Graduate teaching in Medical Science, Calcutta, henceforth shall be conducted only in the name and under the control of the University College of Medicine. For this purpose a Council of Post-Graduate Teaching in Medical Science has been constituted.

There is also an Executive Committee of the College Council.

The management of the University College of Medicine is under the control of the College Council.

For co-ordination of teaching there are Boards of Studies consisting of teachers and Chairman and representatives of the Academic Council.

The work of the Council is being carried out by the Secretary of high academic distinction and an office has been established for the purpose.

There are following departments of Post-Graduate teaching in the First Schedule and the Heads of most of the departments have also been appointed :—

- |  |     |  |
|--|-----|--|
| (1) Department of Anatomy                                      | ... | Dr. H. Chatterjee, M.B., D.A.E.,<br>(Paris).   |
| (2) Department of Psychology, Bio-chemistry, and Biophysics.   |     | Dr. R. B. Sarkar, D.Sc. (Edin.),<br>F.R.S.E.   |
| (3) Department of Pharmacology                                 | ... | Dr. B. B. Roy, M.B., (Cal.).   |
| (4) Department of Pathology, Bacteriology and Medical Zoology. |     | Dr. B. P. Trivedi, M.B. (Cal.),<br>D.B. (Lond.), F.N.I.                                |
| (5) Department of Cancer Research                              | ... | Dr. S. Mitra, M.B. (Cal.), M.D.<br>(Berlin), F.R.C.S. (Edin.),<br>F.R.C.O.G., F.A.C.S. |
| (6) Department of Cardiology                                   | ... | Dr. J. C. Gupta, M.B. (Cal.), M.D.<br>(Cologne).                                       |

- |  |     |   |
|--|-----|---|
| (7) Department of Child Health                       | ... | Dr. K. C. Chaudhuri, M.B., (Cal.).  |
| (8) Department of Dermatology                        | ... | Dr. B. N. Banerjee, M.B. (Cal.),<br>M.R.C.P. (Edin.).                     |
| (9) Department of Diseases of the Chest.             |     | Dr. P. K. Sen, M.B. (Cal.), M.D. (Berlin), Ph.D., T.D.D. (Wales).         |
| (10) Department of Neurology                         | ... | Dr. N. De, M.B., M.R.C.P. (Edin.),<br>D.P.M. (Lond.).                     |
| (11) Department of Experimental Surgery.             |     | Dr. S. R. Mukherjee, D.Sc. (Edin.),<br>Ph D. (Edin.), M.S. (Cal.).        |
| (12) Department of Urology                           | ... | Vacant.   |
| (13) Department of Chest Surgery                     | ... | Dr. A. K. Basu, M.Ch. (Cal.),<br>F.R.C.S. (Eng.), F.A.C.S.                |
| (14) Department of Neuro Surgery                     | ... | Vacant.   |
| (15) Department of Orthopaedics                      | ... | Dr. K. Sarbadhikari, M.B., F.R.C.S. (Eng.), F.R.C.S. (Edin.).             |
| (16) Department of Obstetrics and Gynaecology.       |     | Dr. S. Mitra, M.D. (Berlin),<br>F.R.C.S. (Edin.), F.R.C.O.G.,<br>F.A.C.S. |
| (17) Department of Ophthalmology                     | ... | Dr. K. Sen, M.B. (Cal.), F.R.C.S.,<br>D.O.M.S. (Lond.).                   |
| (18) Department of Radiology and Radio Therapeutics. |     | Dr. S. Mukherjee, M.B., D.M.R.E. (Cantab.).                               |
| (19) Department of Preventive and Social Medicine.   |     | Vacant.   |

and such other Departments as may be added by the Senate from time to time.

Dr. S. Mitra, Head of the Department of Obstetrics and Gynaecology and Cancer Research has been appointed Vice-President of the Council.

The University College of Medicine has started a course in Basic Medical Sciences (Anatomy, Physiology, Biochemistry and Biophysics, Pathology, Bacteriology and Medical Zoology, Pharmacology and Experimental Surgery) and Higher lecture course for M.D., M.S. and M.O.

The proposal for starting the Diploma courses in Radiology, Dermatology and Basic Medical Sciences is now under consideration.

### Calcutta University Press

During the period from 1st June, 1956 to 31st May, 1957, the following books were published by the University in addition to the usual Journals and Text-books :—

1. গিরিশ নাট্যসাহিত্যের বৈশিষ্ট্য (2nd edition), by—  
Sri Amarendranath Roy.
2. স্বাধীন রাষ্ট্রে সংবাদপত্র by—  
Sri Makhanlal Sen.

3. জ্ঞানদাসের পদাবলী (with notes) by—  
Sri Harekrishna Mukhopadhyay and  
Dr. Srikumar Banerjee.
4. Development of Hindu Iconography (2nd edition)  
by—Prof. J. N. Banerjee.
5. Pali Literature and Language (2nd edition of W.  
Geiger), authorised English Translation by—  
Dr. Buttokristo Ghose.
6. Progressive German Reader for Arts and Science  
students by—Dr. Haragopal Biswas.
7. বাংলা সাহিত্যের কথা (5th edition) by—  
Prof. Sukumar Sen.
8. Hand Book of Information for the use of students.
9. Hundred Years of the University of Calcutta.
10. Study of Changes in Traditional Culture by—  
Prof. Kshitishprasad Chattopadhyay.
11. দেবায়তন ও ভারত-সভ্যতা by—  
Sri Srischandra Chatterjee.
12. যোগাচার ভূমি (of Asanga), Part I, Edited by—  
MM. Vidhusekhar Sastri.

## APPENDIX A

### CONSTITUTION OF THE SENATE

Under the Calcutta University Act, 1951

#### *Ex-officio Members*

- (i) Sm. Padmaja Naidu—*Chancellor*.
- (ii) Sri Nirmalkumar Sidhanta, M.A. (Cantab.)—*Vice-Chancellor*.
- (iii) Sri Satischandra Ghosh, M.A.—*Treasurer*.
- (iv) The Director of Public Instruction, West Bengal.
- (v) The Administrator, Board of Secondary Education, West Bengal.
- (vi) *University Professors*—
  1. Prof. Debendranath Banerjee, M.A.
  2. Prof. Jitendranath Banerjee, M.A., Ph.D.
  3. Prof. Jogendrachandra Bardhan, D.Sc. (Cal. & Lond.).
  4. Prof. Sarojkumar Basu, M.A., Ph.D.
  5. Prof. J. L. Bhaduri, D.Sc., (Edin.), F.N.I., F.A.S., F.Z.S.I., F.A.Z.
  6. Prof. Asutosh Bhattacharyya, M.A., Ph.D., Sastri.
  7. Prof. Satyendranath Bose, M.Sc.
  8. Prof. Nirmalnath Chatterjee, M.Sc.
  9. Prof. Sivaprasad Chatterjee, M.Sc., T.D. (Lond.), Ph.D. Educ. (Lond.), D.Litt. (Paris), F.G.S.
  10. Prof. Kshitiprasad Chattopadhyay, M.Sc. (Cantab.).
  11. Prof. Niraj Nath Dasgupta, M.Sc., Ph.D. (Lond.).
  12. Prof. Sashibhushan Dasgupta, M.A., Ph.D.
  13. Prof. Nalinaksha Datta, M.A., Ph.D., D.Lit. (Lond.).
  14. Prof. Bhupendranath Ghosh, D.Sc.
  15. Prof. Bireschandra Guha, M.Sc., Ph.D., D.Sc. (Lond.), F.N.I.
  16. Prof. Suhritchandra Mitra, M.A., D.Phil. (Leipzig), F.N.I.
  17. Prof. Muhammad Zubair Siddiqi, M.A., LL.B., Ph.D. (Cantab.).
  18. Prof. B. D. Nagchaudhuri, M.Sc., Ph.D.
  19. Prof. Jitendraprasad Niyogi, M.A., Ph.D. (Lond.).
  20. Prof. Niharranjan Ray, M.A., D.Litt. & Phil. (Leyden), Dip.Lib. (Lond.), F.L.A.
  21. Prof. Bijolibihari Sarkar, D.Sc., F.R.S.E.
  22. Prof. Pulinbihari Sarkar, M.Sc., D.Phil. Sc., F.N.I., A.I.C.
  23. Prof. Nikhilranjan Sen, D.Sc., Ph.D., F.N.I.
  24. Prof. Pabitrakumar Sen, M.Sc., Ph.D. (Lond.), D.I.C.
  25. Prof. Rabindranath Sen, M.A., Ph.D. (Edin.), F.N.I.
  26. Prof. Sukumar Sen, M.A., Ph.D.
  27. Prof. N. K. Sinha, M.A., Ph.D.
  28. Prof. Miss A. G. Stock, B.A. (Oxon.), Dip.-in-Ed. (Oxon.).
- (vii) *University Readers who are Heads of Departments of Teaching*—
  1. Dr. Ilabanta Banerjee, D.Sc., F.N.I., F.B.S., F.L.S., F.A.Sc.
  2. Dr. Makhanlal Raychaudhuri, M.A., LL.B., D.Litt.
  3. Dr. Purnendrakumar Basu, M.Sc., D.Phil.
  4. Sri Kamalakanta Mukherjee, M.A., B.T., Dip.-Sp.-Eng.
- (viii) The President, Bangiya Sahitya Parisad.
- (ix) The Director, Bose Institute.
- (x) The President, Indian Association for the Cultivation of Science.
- (xi) The President, National Council of Education.

- (xii) The President, Royal Asiatic Society of Bengal.
- (xiii) The President, Vangiya Sanskrita Siksha Parishat.
- (xiv) The Chairman, West Bengal Board of Madrasa Education.
- (xv) *Life Members—*
1. Sri Lalitmohan Banerjee, M.S. (Cal.), F.R.C.S. (Eng.).
  2. Dr. Sambhunath Banerjee, M.Sc., LL.D., Barrister-at-Law.
  3. Dr. Radhabinod Pal, M.A., LL.D.
  - \*4. Dr. Bidhanchandra Roy B.A., M.D., D.Sc., M.R.C.P. (Lond.), F.R.C.S. (Eng.), F.S.M.F. (Bengal).
  5. Dr. Jadunath Sarkar, M.A., D.Litt., M.R.A.S. (Lond.), F.R.A.S.B.
- (xvi) *Elected by the Principals of Constituent Colleges—*
1. Dr. Prabodhchandra Lahiri, M.A., Ph.D. (Lond.), Kavyatirtha, Vidyabhushan, Sahityasastri.
  2. *Vacant.*
  3. *Vacant.*
- (xvii) *Elected by the Principals of Affiliated Colleges—*
1. Sri Amiteschandra Bandyopadhyay, M.A.
  2. Sri Prasantakumar Basu, M.A., (Cal. & Oxon.), LL.B.
  3. Lt.-Col. Amareschandra Chakrabarti, M.Sc.(Cal.), M.A. (Cantab.).
  4. Sri Nepalchandra Ray, M.Sc.
  5. Sri Amiyakumar Sen, M.A.
  6. Sri Arunkumar Sengupta, M.A.
- 7-10. *Vacant.*
- (xviii) *Elected by the Principals of Professional Colleges—*
- †1 Prof. Pramathanath Bandyopadhyay, M.A., B.L., D.Litt., LL.D., Barrister-at-Law, Vidyavachaspati.
  2. Sri Ajitkumar Dattagupta, M.B., D.T.M.
  3. Sri Prabodhchandra Ghosh, M.A.
  4. Sri Manindranath Sarkar, B.A., M.B., F.R.C.S.E., F.R.C.O.G., F.S.M.E.
  5. *Vacant.*
  6. *Vacant.*
  7. *Vacant.*
- (xix) *Elected by the Teachers of the University—*
1. Dr. Minendranath Basu, M.Sc., D.Phil.
  2. Dr. J. N. Bhar, D.Sc.
  3. Sri Nirmalchandra Bhattacharyya, M.A., LL.B., M.L.C.
  4. Dr. Pareschandra Bhattacharyya, D.Sc.
  5. Sri Tripurari Chakrabarti, M.A.
  6. Sm. Jyotiprabha Dasgupta, M.A., B.T., T.D. (Lond.).
  7. Dr. Mrs. Asima Chatterjee, D.Sc.
  8. Dr. Adharchandra Das, M.A., Ph.D.
  9. Sri Hirendramohan Majumdar, M.Sc., LL.B., F.S.A.A., F.C.A.
  10. Sri Dwijendrakumar Sanyal, M.A., B.Com.
  11. Dr. Benoychandra Sen, M.A., LL.B., Ph.D. (Lond.).
  - \*12. Prof. Rabindranath Sen, M.A., Ph.D. (Edin.), F.N.I.
  13. Dr. A. K. Sengupta, D.Sc., A.M.I.E.E.
  14. *Vacant.*
  15. *Vacant.*

---

\*Also an *Ex-officio* Member.

†Also an *ex-officio* Member as a University Professor.



*(xx) Elected by the Teachers of Constituent Colleges—*

1. Dr. Jitendrakumar Chaudhuri, M.Sc. (Cal.), Ph.D. (B'ham).
2. Sri Susobhanchandra Sarkar, M.A. (Cal.), M.A. (Oxon.).
3. Vacant.

*(xxi) Elected by the Teachers of Affiliated Colleges—*

1. Sri Jagadishchandra Bhattacharyya, M.A.
2. Sri Rajkumar Chakrabarti, M.A., LL.B.
3. Sm. Alaka Majumdar, M.A.
4. Sri Hirendranath Mukhopadhyay, M.A., B.Litt. (Oxon.), M.P.
5. Sri Ramanimohan Ray, M.Sc.
6. Sm. Pratibhamayee Sen, M.A.
7. Vacant.

*(xxii) Elected by the Teachers of Professional Colleges—*

1. Sri Umeschandra Chakrabarti, M.B., F.R.C.S. (Eng.).
2. Dr. Baradananda Chattopadhyay, D.Sc.
3. Sri Hirendrakumar Chattopadhyay, M.B., D.A.E. (Paris), F.R.S.M. (Lond.), M.L.A.
4. Dr. Sunilkrishna Datta, M.D.
5. Dr. Amiyabhushan Mukhopadhyay, M.D., M.R.C.P. (Lond.).
6. Sri Kehaunischandra Ray, B.E.
7. Dr. Amalkumar Raychaudhuri, M.D.
8. Vacant.
9. Vacant.
10. Vacant.

*(xxiii) Elected by the members of the Governing Bodies of Colleges situated within Calcutta—*

1. Sri Satyendranath Modak M.A., B.A. (Cantab.), Bar.-at-Law.
2. Justice Sri Ramaprasad Mookerjee, M.A., LL.B.

*(xxiv) Elected by the members of the Governing Bodies of Colleges situated within the Presidency Division—*

1. Dr. Anilchandra Bandyopadhyay, M.A., Ph.D.
2. Sri Jagadishchandra Sinha, B.A.

*(xxv) Elected by the members of the Governing Bodies of Colleges situated within the Burdwan Division—*

1. Sri Anupkrishna Mukhopadhyay, B.Com., F.C.A.
2. Sri Himansubhushan Sarkar, M.A.

*(xxvi) Elected by the members of the Legislative Assembly, West Bengal—*

1. Sm. Mira Dattagupta, M.A., M.L.A.
2. Sri Priyaranjan Sen, M.A., M.L.A.

*(xxvii) Elected by the members of the Legislative Council, West Bengal—*

1. Vacant.

*(xxviii) Elected by the Registered Graduates—*

1. Sri Debajyoti Barman, M.A.
2. Dr. Atindranath Basu, M.A., Ph.D.
3. Sri Keshaveswar Basu, M.A., Dip. in Edn. (Leeds).
4. Sri Chapalakanta Bhattacharyya, M.A., LL.B.
5. Sri Nirodkumar Bhattacharyya, M.A.
6. Sri Kshirodchandra Chaudhuri, M.B.
7. Dr. Sarojkumar Das, M.A., Ph.D.
8. Sri Jitendranath Dasgupta, B.E., B.A., M.A.E., M.I.E. (Ind.), M.I.R.C.

9. Sri Bhupalkrishna Datta, B.F.
10. Sm. Anila Debi, M.A.
11. Sri Jagannath Gangopadhyay, B.E., M.I.E. (Ind.), M.I.S. (Ind.).
12. Sri Bidhubhushan Ghosh, B.E., A.M.I.E., M.Amer.Soc.R.E.,  
M.Amer.Soc.H.V.E.
13. Sri Devaprasad Ghosh, M.A., B.L., M.P.
14. Sri Nandakishor Ghosh, B.A., LL.B. (Leeds), Barrister-at-Law.
15. Sri Prasantakumar Ghosh, M.B., D.T.M. (Cal.), T.D.D. (Wales),  
M.R.C.P. (Lond.), F.R.C.P. (Edin.), F.C.C.P. (U.S.A.).
16. Sri Gopal Haldar, M.A.
17. Sri Mohitkumar Maitra, B.A., M.P.
18. Dr. Subodh Mitra, M.B. (Cal.), M.D. (Berlin), F.R.C.S. (Edin.),  
F.R.C.O.G. (Lond.), F.A.C.S., F.N.I.
19. Sri Niharkumar Munshi, M.B., D.O.M.S. (Lond.).
20. Sri Kalidas Ray, B.E., C.E., M.I.E. (Ind.).
21. Sri Kanakchandra Sarbadhikari, M.B.
22. Sri Sailendranath Sen, M.B., M.R.C.P. (Edin.).
23. Dr. Bibekmohan Sengupta, M.B. (Cal.), M.D. (Freiburgh).
24. Sri Himansukumar Sett, M.B., F.R.C.S.
25. *Vacant.*

(xxix) *Nominated members—*

1. Sri Prabhatnath Banerjee, M.A. (Cantab.), M.I.E. (Ind.).
  2. Sri Sankardas Banerjee, Barrister-at-Law.
  3. Prof. Suniti Kumar Chatterji, M.A., D.Lit. (Lond.), F.A.S., M.L.C.
  4. Sri Hemendraprasad Ghosh, B.A.
  5. Sri Kaliprasad Khaitan, M.A., LL.B., Barrister-at-Law.
  6. Dr. N. N. Law, M.A., B.L., P.R.S., Ph.D.
  7. Sri Dhiren Mitter, LL.B.
  8. Sm. Charulata Mookerjee.
  9. Dr. Jnanendranath Mookerjee, D.Sc.
  10. Captain P. B. Mookerjee, B.Sc., M.B. (Cal.), F.R.C.S. (Edin.),  
D.M.R.E. (Camb.), F.F.R. (Lond.), F.I.C.S., F.S.M.F.
  11. Sm. Ranu Mookerjee.
  12. Dr. R. Ahmed, D.D.S., F.I.C.D., F.D.S., R.C.S., M.L.A.
  13. Dr. Triguna Sen, Dr.Ing. (Munich), A.M.M.E. (B.Tech.), M.I.E.  
(Ind.).
  14. Sri Bejoyprasad Singh Roy.
  15. Rev. Father A. Verstraeten, S.J.
-

## APPENDIX B

## CONSTITUTION OF THE SYNDICATE

1. Sri Nirmalkumar Sidhanta, M.A. (Cantab.), *Vice-Chancellor.*
2. Sri Satischandra Ghosh, M.A., *Treasurer.*
3. Dr. Parimal Roy, M.A., Ph.D., *Director of Public Instruction, West Bengal.*
4. Prof. S. K. Mitra, D.Sc., F.N.I. *Administrator, Board of Secondary Education, West Bengal.*
5. Prof. Jitendraprasad Niyogi, M.A., Ph.D. (Lond.), *Dean of the Faculty of Arts.*
6. Justice Sri Ramaprasad Mookerjee, M.A., LL.B., *Dean of the Faculty of Law.*
7. Prof. Nikhilaranjan Sen, D.Sc., Ph.D., F.N.I., *Dean of the Faculty of Science (acting).*
8. Dr. Subodh Mitra, M.B. (Cal.), M.D. (Berlin), F.R.C.S. (Edin.), F.R.C.O.G. (Lond.), F.A.C.S., F.N.I., *Dean of the Faculty of Medicine.*
9. Sri Atulchandra Ray, B.Sc. (Glas.), A.M.I.E., *Dean of the Faculty of Engineering.*
10. Prof. Bireschandra Guha, M.Sc., Ph.D., D.Sc. (Lond.), F.N.I., *Dean of the Faculty of Technology.*

*Elected by the Senate—*

11. Sri Chapalakanta Bhattacharyya, M.A., LL.B.
12. Sri Kshirodchandra Chaudhuri, M.B.
13. Sri Bidhubhushan Ghosh, B.E., A.M.I.E., M.Amer.Soc.R.E., M.Amer.Soc.H.V.E.
14. Sri Nandakishor Ghosh, B.A., LL.B. (Leeds), Barrister-at-Law.
15. Sri Gopal Haldar, M.A.
16. Sri Mohitkumar Maitra, B.A., M.P.
17. Sri Satyendranath Modak, M.A., B.A. (Cantab.), Barrister-at-Law.
18. Sri Kalidas Ray, B.E.

*Elected by the Academic Council—*

19. Prof. Pramathanath Banerjee, M.A., B.L., D.Litt., LL.D., Barrister-at-Law, Vidyevachaspati,
  20. Sri Prasantakumar Bose, M.A. (Cal. & Oxon.), LL.B.
  21. Dr. Prabodhchandra Lahiri, M.A., Ph.D.
  22. Prof. Sivaprasad Chatterjee, M.Sc., T.D. (Lond.), Ph.D.Educ. (Lond.), D.Litt. (Paris), F.G.S.
-

## APPENDIX C

### CONSTITUTION OF THE ACADEMIC COUNCIL

(As on 1st January, 1957)

#### *Ex-officio Members*

- (i) The Vice-Chancellor—*Chairman, ex-officio.*
- (ii) The Deans of the Faculties :—
  - \* (1) Prof. Pabitrakumar Sen, M.Sc., Ph.D. (Lond.), D.I.C.—*Dean of the Faculty of Agriculture.*
  - \* (2) Prof. Jitendraprasad Niyogi, M.A., Ph.D. (Lond.)—*Dean of the Faculty of Arts.*
  - \* (3) Dr. Sarojkumar Basu, M.A., Ph.D.—*Dean of the Faculty of Commerce.*
  - \* (4) Prof. Sivaprasad Chatterjee, M.Sc., T.D. (Lond.), Ph.D. Educ. (Lond.), D.Litt. (Paris), F.G.S.—*Dean of the Faculty of Education.*
  - (5) Sri Atulchandra Roy, B.Sc. (Hons.), Glas., A.M.I. Mech. E., M.I.E. (Ind.)—*Dean of the Faculty of Engineering.*
  - (6) Prof. Suniti Kumar Chatterji, M.A., D.Lit. (Lond.)—*Dean of the Faculty of Fine Arts and Music.*
  - † (7) Sri Ramaprasad Mookerjee, M.A., LL.B.—*Dean of the Faculty of Law.*
  - (8) Dr. Subodh Mitra, M.B. (Cal.), M.D. (Berlin), F.R.C.S. (Edin.), F.R.C.O.G. (Lond.), F.A.C.S., F.N.I.—*Dean of the Faculty of Medicine.*
  - \* (9) Prof. Nikhilranjan Sen, D.Sc., Ph.D., F.N.I.—*Dean of the Faculty of Science.*
  - \* (10) Prof. Bireschandra Guha, M.Sc., Ph.D., D.Sc. (Lond.), F.N.I.—*Dean of the Faculty of Technology.*
  - † (11) Capt. P. B. Mookerjee, B.Sc., M.B. (Cal.), F.R.C.S. (Edin.), D.M.R.E. (Camb.), F.F.R. (Lond.), F.I.C.S., F.S.M.F.—*Dean of the Faculty of Veterinary Science.*
- (iii) *The Director of Public Instruction, West Bengal.*
- (iv) *The Administrator, Board of Secondary Education, West Bengal.*
- (v) *University Professors:—*
  - (1) Prof. Debendranath Banerjee, M.A.
  - (2) Prof. Jitendranath Banerjee, M.A., Ph.D.
  - (3) Prof. Sarojkumar Basu, M.A., Ph.D.
  - (4) Prof. Miss A. G. Stock, B.A. (Oxon.), Dip. in Edn. (Oxon.).
  - (5) Prof. Sashibhusan Dasgupta, M.A. Ph.D.
  - (6) Prof. Narendrakrishna, Sinha, M.A., Ph.D.
  - (7) Prof. Basantidulal Nagchaudhuri, M.Sc., Ph.D.
  - (8) Prof. Asutosh Bhattacharyya, M.A., Ph.D., Sastri.
  - (9) Prof. J. L. Bhaduri, D.Sc., (Edin.), F.N.I., F.A.S., F.A.Z.

---

\*Also an *ex-officio* Member as a University Professor or a Reader who is the Head of a Department.

†Also Elected by the Senate.

- (10) Prof. Jogendrachandra Bardhan, D.Sc.
- (11) Prof. Satyendranath Bose, M.Sc.—On leave.
- (12) Prof. Nirmalnath Chatterjee, M.Sc.
- \* (13) Prof. Sivaprasad Chatterjee, M.Sc., T.D. (Lond.), Ph.D. Educ. (Lond.), D.Litt. (Paris), F.G.S.
- (14) Prof. Kshitiprasad Chattopadhyay, M.Sc. (Cantab.).
- (15) Prof. Nirajnath Dasgupta, M.Sc., Ph.D. (Lond.).
- (16) Prof. Nalinaksha Datta, M.A., Ph.D., D.Lit. (London).
- (17) Prof. Bhupendranath Ghosh, D.Sc.
- \* (18) Prof. Bireschandra Guha, M.Sc., Ph.D., D.Sc. (Lond.), F.N.I.
- (19) Prof. Suhritchandra Mitra, M.A., D.Phil. (Leipzig), F.N.I.
- (20) Prof. Muhammad Zubair Siddiqi, M.A., LL.B., Ph.D. (Cantab.).
- \* (21) Prof. Jitendraprasad Niyogi, M.A., Ph.D. (Lond.).
- (22) Prof. Niharranjan Ray, M.A., D.Lett.Phil. (Leyden), Dip.Lib. (Lond.), F.L.A.
- (23) Prof. Bijalibihari Sarkar, D.Sc., F.R.S.E.
- (24) Prof. Pulinbihari Sarkar, Dr.-es-Sc., A.I.C.
- \* (25) Prof. Nikhilranjan Sen, D.Sc., Ph.D., F.N.I.
- \* (26) Prof. Pabitrakumar Sen, M.Sc., Ph.D. (Lond.), D.I.C.
- (27) Prof. Rabindranath Sen, M.A., Ph.D. (Edin.), F.N.I.
- (28) Prof. Sukumar Sen, M.A., Ph.D.

(vi) *University Readers who are Heads of Departments of Teaching :—*

- (1) Dr. Purnendukumar Basu, M.Sc., D.Phil.
- (2) Dr. A. K. Sengupta, D.Sc., A.M.I.E.E.
- (3) Dr. J. N. Bhar, D.Sc.
- (4) Dr. Pareschandra Bhattacharyya, D.Sc.
- (5) Dr. Ilabanta Banerjee, D.Sc., F.N.I., F.I.S., F.A.Sc.
- (6) Sri Kamalakanta Mookerjee, M.A., B.T., Dip.-in-Sp.-Eng.
- (7) Dr. Makhanlal Raychaudhuri, M.A., LL.B., D.Litt., Sastri.

(vii) *Principals of Constituent Colleges:—*

- (1) Principal, Presidency College, Calcutta.
- (2) Principal, Sanskrit College, Calcutta.
- (3) Principal, Medical College, Calcutta.
- (4) Principal, R. G. Kar Medical College, Calcutta.
- \* (5) Principal, B. E. College.
- (6) Principal, David Hare Training College.
- (7) Director, All-India Institute of Hygiene and Public Health.

*Other Members*

(viii) *Elected by the Principals of Affiliated Colleges:—*

- (1) Sri Prasantakumar Basu, M.A. (Cal. & Oxon.), LL.B.

(ix) *Elected by the Principals of Professional Colleges:—*

- (1) Prof. Pramathanath Bandyopadhyay, M.A., B.L., D.Litt. LL.D., Barrister-at-Law, *Vidyavachaspati*.
- (2) Sri Prabodhchandra Ghosh, M.A.

(x) *Elected by the Teachers of Constituent Colleges :—*

- (1) Dr. Nirmalendunath Ray, D.Sc.
- (2) Sri Sunilchandra Sen, M.Sc.
- (3) Dr. Subodhchandra Sengupta, M.A., Ph.D.

---

\* Also Dean of a Faculty.

**(xi) Elected by the Teachers of Affiliated Colleges:—**

- (1) Sri Jagadischandra Bhattacharyya, M.A.
- (2) Sri Nirmalchandra Bhattacharyya, M.A., LL.B.
- (3) Sri Arunkumar Sen, M.A. (Cal.), M.Sc.Econ. (Lond.), Barrister at-Law.

**(xii) Elected by the Senate :—**

- (1) Dr. D. M. Basu, M.A., Ph.D.
- (2) Sri Bidhubhushan Ghosh, B.E., A.M.I.E., M.Amer.Soc., R.E., M.Amer.Soc., H.V.E.
- (3) Sri Devaprasad Ghosh, M.A., LL.B., M.P.
- (4) Sri Nandakisor Ghosh, B.A., LL.B. (Leeds), Barrister-at-Law.
- (5) Sri Satyendranath Modak, M.A., B.A. (Cantab.), Barrister-at-Law.
- \* (6) Capt. P. B. Mookherjee, B.Sc., M.B. (Cal.), F.R.C.S. (Edin.), D.M.R.E. (Camb.), F.F.R. (Lond.), F.I.C.S., F.S.M.F.
- \* (7) Sri Ramaprasad Mookerjee, M.A., LL.B.

---

\*Also Dean of a Faculty.

## APPENDIX D

As on 1st January, 1957

### FACULTIES

#### 1. FACULTY OF AGRICULTURE

- Prof. Pabitrakumar Sen, M.Sc., Ph.D. (Lond.), D.I.C.—*Dean*.  
 „ Jogendrachandra Bardhan, D.Sc. (Cal. & Lond.).  
 „ Nirmalnath Chatterjee, M.Sc.  
 „ Sivaprasad Chatterjee, M.Sc., T.D. (Lond.), Ph.D. Educ.  
 (Lond.), D.Litt. (Paris), F.G.S.  
 \*Dr. Jitendrakumar Chaudhuri, M.Sc. (Cal.), Ph.D. (B'ham).  
 \*Sri Debendranath Mitra, M.A.  
 Sri Ramaprasad Mookerjee, M.A., LL.B.  
 Prof. Pulinbehari Sarkar, Dr. es Sc., A.I.C.  
 \*Dr. Saurindramohan Sarkar, M.Sc., Ph.D. (Lond.), D.I.C., F.N.I.

#### 2. FACULTY OF ARTS

- Prof. Jitendraprasad Niyogi, M.A., Ph.D. (Lond.)—*Dean*.  
 \*Dr. Anilchandra Banerjee, M.A., Ph.D.  
 Prof. Debendranath Banerjee, M.A.  
 „ Jitendranath Banerjee, M.A. Ph.D.  
 „ Pramathanath Banerjee, M.A., B.L., D.Litt., LL.D., Barrister-at-Law, Vidyavachaspati.  
 Sri Prasantakumar Basu, M.A. (Cal. & Oxon.), LL.B.  
 Prof. Sarojkumar Basu, M.A., Ph.D.  
 Sri Jagadishchandra Bhattacharyya, M.A.  
 Sri Nirmalchandra Bhattacharyya, M.A., LL.B.  
 \*Sri Tripurari Chakrabarti, M.A.  
 \*Prof. Suniti Kumar Chatterji, M.A., D.Lit. (Lond.).  
 „ Nalinaksha Datta, M.A., Ph.D., D.Lit. (Lond.)  
 \*Sm. Mira Dattagupta, M.A., M.L.A.  
 Sri Devaprasad Ghosh, M.A., LL.B.  
 „ Nandakisor Ghosh, B.A., LL.B. (Leeds), Barrister-at-Law.  
 „ Prabodhchandra Ghosh, M.A.  
 Dr. Prabodhchandra Lahiri, M.A., Ph.D.  
 Sri Satyendranath Modak, M.A., B.A. (Cantab.), Barrister-at-Law.  
 Sri Ramaprasad Mookerjee, M.A., LL.B.  
 Prof. Muhammad Zubair Siddiqi, M.A., LL.B., Ph.D. (Cantab.).  
 Sri Dwijendranath Ray, M.Sc. (Cal.), B.T. (Dac.), M.A. in-Edn. (Lond.).  
 Prof. Niharranjan Ray, M.A., D.Litt.Phil. (Leyden), Dip.Lib. (Lond.), F.L.A.  
 Dr. Parimal Ray, M.A., Ph.D.  
 Sri Arunkumar Sen, M.A. (Cal.), M.Sc. (Econ.) (Lond.), Barrister-at-Law.  
 Prof. Rabindranath Sen, M.A., Ph.D. (Edin.), F.N.I.  
 Dr. Subodhchandra Sengupta, M.A., Ph.D.  
 \*Prof. Narendrakrishna Sinha, M.A., Ph.D.

#### 3. FACULTY OF COMMERCE

- Prof. Sarojkumar Basu, M.A., Ph.D.—*Dean*.  
 Prof. Debendranath Banerjee, M.A.

---

\*Member under clauses (b) and (c) of Section 4(2) of the Statutes.

- \*Sri Nirodkumar Bhattacharyya, M.A.
- \* ,, Harisadhan Chatterjee, M.A., B.L.
- Prof. Nalinaksha Datta, M.A., Ph.D., D.Lit. (Lond.).
- Sri Prabodhchandra Ghosh, M.A.
- \* ,, Hirendramohan Majumdar, M.Sc.; LL.B., F.C.A., F.S.A.A
- Prof. Jitendraprasad Niyogi, M.A., Ph.D. (Lond.).
- Dr. Parimal Ray, M.A., Ph.D.
- \*Sri S. C. Ray, M.A., LL.B.
- Sri Arunkumar Sen, M.A. (Cal.), M.Sc. (Econ.) (Lond.), Barrister at-Law.

#### 4. FACULTY OF EDUCATION

- Prof. Sivaprasad Chatterjee, M.Sc., T.D. (Lond.), Ph.D. Educ. (Lond.), D.Litt. (Paris), F.G.S.—*Dean*.
- Prof. Pramathanath Banerjee, M.A., B.L., LL.D., D.Litt., Barrister-at-Law, Vidyavachaspati.
- Sri Nirmalchandra Bhattacharyya, M.A., LL.B.
- Prof. Kshitiprasad Chattopadhyay, M.Sc. (Cantab.).
- \*Sm. Jyotiprabha Dasgupta, M.A., B.T., T.D. (Lond.).
- \*Dr. Phulrenu Guha, M.A., D.Litt. (Paris).
- Prof. Suhritchandra Mitra, M.A., D.Phil. (Leipzig).
- Sri D. N. Ray, M.Sc. (Cal.), B.T. (Dac.), M.A. in Edn. (Lond.).
- Dr. Parimal Ray, M.A., Ph.D.

#### 5. FACULTY OF ENGINEERING

- \*Sri Atulchandra Ray, B.Sc. (Glas.), A.M.I.E. (Ind.), Principal, B. I. College—*Dean*.
- \*Dr. Jatindranath Basu, Dr.Eng. (Berlin), M.A.E., M.I.E., M.L.A. V.D.I.
- Prof. Satyendranath Bose, M.Sc.
- \*Sri B. B. Bhowmik, M.Sc. (Cal.), M.Sc. (Eng.) (Lond.).
- \*Dr. Baradananda Chatterjee, D.Sc.
- Prof. Nirmalnath Chatterjee, M.Sc.
- \*Sri Bhupatinath Chaudhuri, B.E.
- Sri Bidhubhushan Ghosh B.E., A.M.I.E., M.Amer. Soc. R.E. M.Amer. Soc. H.V.E.
- \*Sri Priya Guha, B.E., C.E., M.I.E., A.I.A.A.
- Dr. Nirmalendunath Ray, D.Sc.
- \*Dr. Triguna Sen, Dr Ing. (Munich), A.M.M.E., M.I.E. (Ind.).

#### 6. FACULTY OF FINE ARTS AND MUSIC

- \*Prof. Suniti Kumar Chatterji, M.A., D.Lit. (Lond.)—*Dean*.
- Prof. Jitendranath Banerjee, M.A., Ph.D.
- Sri Jagadishchandra Bhattacharyya, M.A.
- Prof. Nalinaksha Datta, M.A., Ph.D., D.Lit. (Lond.).
- Sri Bidhubhushan Ghosh B.E., A.M.I.E., M.Amer.Soc. R.E. M.Amer.Soc. H.V.E.
- \*Sri Devaprasad Ghosh, M.A.
- \*Dr. Mrs. Sati Ghosh, M.A., D.Phil.
- Dr. Prabodhchandra Lahiri, M.A., Ph.D.
- \*Lady Ranu Mukherjee.
- Prof. Niharrajan Ray, M.A., D.Lett. Phil. (Leyden), Dip.Lib. (Lond.). F.L.A.
- \*Sri Birendrakisor Raychaudhuri.



## 7. FACULTY OF LAW

- Sri Ramaprasad Mookerjee, M.A., LL.B.—*Dean*.  
 Prof. Pramathanath Banerjee, M.A., B.L., D.Litt., LL.D., Barrister-at-Law, Vidyavachaspati.  
 Sri Prasantakumar Basu, M.A. (Cal. & Oxon.), LL.B.  
 \*Dr. Susilohandra Chaudhuri, M.A., LL.D., Barrister-at-Law.  
 Sri Devaprasad Ghosh, M.A., LL.B.,  
 „ Nandakisor Ghosh, B.A., LL.B. (Leeds), Barrister-at-Law.  
 „ Satyendranath Modak, M.A., B.A. (Cantab.), Barrister-at-Law.  
 \*Dr. Radhabinod Pal, M.A., LL.D.  
 Sri Arunkumar Sen, M.A. (Cal.), M.Sc. Econ. (Lond.), Barrister-at-Law.

## 8. FACULTY OF MEDICINE

- \*Dr. Subodh Mitra, M.B. (Cal.), M.D. (Berlin), F.R.C.S. (Edin.), F.R.C.O.G. (Lond.), F.A.C.S., F.N.I.—*Dean*.  
 \*Sri Kumarnath Bagchi, B.Sc., M.B., D.T.M., F.R.I.C., F.N.I.  
 \* „ Hirendrakumar Chatterjee, M.B.B.S. (Cal.), D.A.E. (Paris), F.R.S.M. (Lond.).  
 Prof. Bireschandra Guha, M.Sc., Ph.D., D.Sc. (Lond.), F.N.I.  
 Captain P. B. Mookerjee, M.B. (Cal.), F.R.C.S. (Edin.), D.M.R.E.  
 \*Dr. Bidhanchandra Roy, B.A., M.D., D.Sc., M.R.C.P. (Lond.), F.R.C.S. (Eng.), F.S.M.F., M.L.A.  
 Dr. Amalkumar Raychaudhuri, M.D., *Principal, R. G. Kar Medical College*.  
 Prof. Bijalibehari Sarkar, D.Sc., F.R.S.E.  
 Sri Manindranath Sarkar, B.A., M.B., F.R.C.S.E., F.R.C.O.G., *Principal, Medical College*.  
 \*Sri Sailendranath Sen, M.B., M.R.C.P. (Edin.).  
 „ Sunilohandra Sen, M.Sc.  
 \*Dr. Bibekmohan Sengupta, M.B. (Cal.), M.D. (Freiburg).  
 \*Sri Himansukumar Set, M.B., F.R.C.S.  
 \* „ Amulyachandra Ukil, M.B. (Cal.), M.S.P.E. (Paris), F.C.C.P., F.S.M.F., F.N.I., F.A.S.

## 9. FACULTY OF SCIENCE

- Prof. Nikhilranjan Sen, D.Sc., Ph.D., F.N.I.—*Dean*.  
 Prof. Satyendranath Basu, M.Sc.  
 „ Jogendrachandra Bardhan, D.Sc. (Cal. & Lond.).  
 Dr. D. M. Basu, M.A., Ph.D., Director, Bose Institute.  
 \* „ Umapasanna Basu, D.Sc., F.N.I.  
 \* „ Duhkhaharan Chakravarti, D.Sc., F.N.I.  
 Prof. Kshitishprasad Chattopadhyay, M.Sc. (Cantab.).  
 „ Nirmalnath Chatterjee, M.Sc.  
 „ Sivaprasad Chatterjee, M.Sc., T.D. (Lond.), Ph.D. Educ. (Lond.), D.Litt. (Paris), F.G.S.  
 „ Bhupendranath Ghosh, D.Sc.  
 Sri Devaprasad Ghosh, M.A., LL.B.  
 Prof. Bireschandra Guha, M.Sc., Ph.D., D.Sc. (Lond.), F.N.I.  
 Prof. Suhritchandra Mitra, M.A., D.Phil. (Leipzig).  
 Captain P. B. Mookerjee, M.B. (Cal.), F.R.C.S. (Edin.), D.M.R.E.  
 Dr. Nirmalendunath Ray, D.Sc.

---

\*Member under clauses (b) and (c) of Section 4(2) of the Statutes.

**Dr. Amalkumar Raychaudhuri, M.D., *Principal, R. G. Kar Medical College.***

**Prof. Bijalibehari Sarkar, D.Sc., F.R.S.E.**

„ **Pulinbehari Sarkar, D.Sc., A.I.C.**

„ **Pabitrakumar Sen, M.Sc., Ph.D. (Lond.), D.I.C.**

„ **Rabindranath Sen, M.A., Ph.D. (Edin.), F.N.I.**

**Sri Sunilchandra Sen, M.Sc.**

## 10. FACULTY OF TECHNOLOGY

**Prof. Bireschandra Guha, M.Sc., Ph.D., D.Sc. (Lond.), F.N.I.—*Dean.***

**\*Dr. Arabindanath Basu, Ph.D., M.I.T.**

**Dr. D. M. Bose, M.A., Ph.D., *Director, Bose Institute.***

**Prof. Satyendranath Bose, M.Sc.**

**Prof. Bhupendranath Ghosh, D.Sc.**

**Sri Bidhubhushan Ghosh, B.E. A.M.I.E., M.Amer. Soc. R.E., M.Amer. Soc. H.V.E.**

**\*Dr. Jnanachandra Chosh, D.Sc., F.N.I.**

**\*Dr. Sudhirchandra Niyogi, D.Sc.**

„ **Hrishikesh Rakshit, D.Sc.**

**Prof. Nikhilranjan Sen, D.Sc., Ph.D., F.N.I.**

**\*Dr. Triguna Sen, Dr.Ing. (Munich), A.M.M.E. (B.Tech.), M.I.E. (Ind.).**

## 11. FACULTY OF VETERINARY SCIENCE

**Captain P. B. Mookerjee, M.B. (Cal.), F.R.C.S. (Edin.), D.M.R.E.—*Dean.***

**\*Sri Kumarnath Bagchi, B.Sc., M.B., D.T.M., F.R.I.C., F.N.I.**

**\*Major J. M. Lahiri, M.R.C.V.S.**

**\*Sri K. C. Mukherjee, M.Sc., M.R.C.V.S.**

**\*Dr. Rudrendrakumar Pal, D.Sc. (Edin.), M.Sc., M.B., M.R.C.P., F.R.S.E.**

**\*Dr. Dulalpada Sadhu, M.Sc., Ph.D.**

**Prof. Bijalibehari Sarkar, D.Sc., F.R.S.E.**

**Sri Manindranath Sarkar, B.A., M.B., F.R.C.S.E., F.R.C.O.G., *Principal, Medical College.***

**Prof. Pabitrakumar Sen, M.Sc., Ph.D. (Lond.), D.I.C.**

**Sri Sunilchandra Sen, M.Sc.**

**\*Sri Amulyachandra Ukil, M.B. (Cal.), M.S.P.E. (Paris), F.C.C.P., F.S.M.F., F.N.I., F.A.S.**

**\*Member under clauses (b) and (c) of Section 4(2) of the Statutes.**

## APPENDIX ' E '

### CHANGES IN THE REGULATIONS AND SYLLABUSES

#### CHAPTERS XXXI & XXXV

The following changes were made in Chapters XXXI (I.A.) and XXXV (I.Sc.) of the Regulations :—

" That the undermentioned clause be added at the end of rule 8 of Chapter XXXI (I.A.) and Chapter XXXV (I.Sc.) of the Regulations :—

' No candidate shall be allowed to take up Mathematics or Physics or Chemistry as a subject for the Intermediate Examinations unless he has already passed the School Final Examination with Mathematics as one of his subjects "

#### CHAPTER XXXIV-A

The following changes were made in Chapter XXXIV-A of the Regulations relating to B.Com. Examination :—

(i) In Rule 6 : Delete the first sentence and substitute the following :—

" As soon as possible after the examination, the Syndicate shall publish a list of the candidates who have passed arranged in the following manner :—

- |                  |     |                           |
|------------------|-----|---------------------------|
| (a) First Class  | ... | In order of merit         |
| (b) Second Class | ... | In order of merit, and    |
| (c) Pass         | ... | Arranged alphabetically." |

(ii) In Rule 10 : Delete the Section and substitute :—

" In order to pass, a candidate must obtain 30 per cent. of the marks in each subject or group of subjects and 36 per cent. of marks in the aggregate, provided that a candidate who takes up an Indian Language must obtain 40 per cent. of the marks in the subject. Successful candidates obtaining 50 per cent. or more marks in the aggregate shall be declared to have obtained First Class; and those obtaining 40 per cent. or more marks but less than 60 per cent. marks in the aggregate shall be declared to have obtained Second Class; other successful candidates shall be declared as having passed and shall not be placed under any Class."

The above changes are effective from the B.Com. Examination of 1957.

#### CHAPTERS XXXV & XXXVI

The following revised syllabuses in Chemistry for the Intermediate, B.A. and B.Sc. Examinations were adopted :—

#### REVISED SYLLABUS IN CHEMISTRY

##### Intermediate Examinations

##### *Theoretical*

The course would be distributed as follows :—

Paper I—Group A—General Chemistry (30 marks)	} ... 75 (30+45) marks
Group B—Non-metals (45 ,, )	
Paper II—Group A—Metal (45 marks)	} .... 75 (45+30) marks
Group B—Organic Chemistry (30 ,, )	

Sufficient choice of questions will be allowed.

##### *General Chemistry*

Mixtures and Pure substances. Common Laboratory processes; solution, crystallisation, decantation; filtration, evaporation, distillation, sublimation;

separation of ingredients of simple mixtures by these processes. Solubility. Physical and chemical changes. Conservation of mass, Elements and Compounds.

Laws of chemical combination by weight and by volume. Dalton's atomic theory. Avogadro's law. Atoms, molecules, symbols, formulae and equations. valency (definition only).

Determination of approximate atomic weights (by vapour density and percentage composition, atomic heat of solid elements, application of law of isomorphism) Equivalent weight; exact atomic weight from equivalent weight.

Faraday's laws of electrolysis. Elementary ideas of Ionic Theory. Acids bases, salts; neutralisation.

General Principles of periodic law of elements. Elementary ideas of atomic structure, electro-valency and co-valency.

Chemical problems on the subject-matter of the course

### *Non-Metals*

Only laboratory methods of preparation, unless otherwise specified, properties and uses of the following are to be studied. Where large-scale preparation is included, only an outline of the Chemistry of the process—omitting all manufacturing and technological details would be required; physico-chemical principles are not expected.

Hydrogen (including preparation by electrolysis of water). Oxygen including preparation from liquid air—details of liquefaction and fractionation being omitted); catalysis, combustion, oxydation, reduction (definition and illustration only); classification of oxides. Water-purification, softening of hard water, gravimetric and volumetric composition; water of crystallisation, solubility. Hydrogen peroxide; ozone (including formula); allotropy (definition and illustrations only).

Composition of air by weight and by volume. Nitrogen, Nitrous oxide, nitric oxide, nitrogen peroxide; thermal dissociation. Ammonia including outline of synthetic preparation. Nitric acid (including large scale preparation from sodium, nitrate and ammonia; action of nitric acid on carbon, iodine, sulphur, phosphorus, hydrogen sulphide, magnesium, iron, zinc, tin, copper and silver.

Carbon—Allotropic forms and oxides. Volumetric composition of oxides; gravimetric composition of carbon dioxide. Coal gas. Structure of flame.

Halogens and their hydracids; large scale preparations of hydrochloric acid; chlorine, bromine and iodine; volumetric composition of hydrochloric acid; Bleaching powder (omitting deduction of formula); potassium chlorate.

Sulphur—Extraction; modifications of sulphur. Hydrogen sulphide; sulphur dioxide; sulphuric acid (including manufacture)

Phosphorus—Extraction and properties of yellow and red phosphorus, Phosphine. Tri and Penta-oxide; ortho phosphoric acid. Phosphorus tri and penta-chloride (preparation); hydrolysis.

Boric acid and borax. Silica, sodium silicate, silicic acid, dialysis.

### *Metals*

Differences between metals and non-metals. Occurrence, chemistry of methods of winning (omitting metallurgical details), properties and uses of the following metals:—

Sodium, potassium, copper, silver, calcium, magnesium, zinc, mercury, aluminium, tin, lead and iron.

**Preparation (including chemistry of large-scale preparation), properties and uses of their oxides, hydroxides, chlorides, sulphates, sulphides, nitrates and carbonates.**

### *Organic Chemistry*

**Definition of Organic Chemistry, classification of organic compounds by functional groups, purification of organic compounds, fractional distillation.**

**Study of the properties of the different functional groups (unsaturation hydroxyl group, carbonyl group, carboxyl group, ester group, halogen, amino group) using the following compounds as typical examples :**

**Methane, ethane, ethylene, acetylene, chloroform, iodoform, methyl alcohol, ethyl alcohol, diethyl ether, formaldehyde, acetaldehyde, acetone, formic acid, acetic acid, glucose, cane-sugar.**

**Any simple method of the preparation of the above (omitting details).**

**Elementary ideas about the aromatic compounds, benzene, aniline, phenol.**

### **Practical**

#### *Inorganic*

1. Fitting up of simple apparatus e.g. a wash-bottle.
2. Separation of the ingredients of a solid mixture by solution, filtration, crystallisation, and sublimation.

**Performance of experiments involving distillation.**

3. Preparation and study of the principal properties of hydrogen, nitric oxide, carbon dioxide, oxygen, ammonia, hydrochloric acid.

4. (a) Qualitative analysis, both by the dry and the wet way of simple substances containing not more than one acid and one radical included in the following list :

**Silver, lead, mercury, copper, tin, iron, aluminium, zinc, calcium, magnesium, sodium, potassium and ammonium ;**

**(b) Chloride, nitrate, sulphide, sulphate and carbonate**

**Note.—A simple substance is one which is soluble in water or in boiling hydrochloric acid.**

5. Use of the chemical balance.
6. Elementary acidimetry and alkalimetry.
7. Organic chemistry :—Detection of N, S, Cl, Br, I and Carbonyl group.

**Note.—Marks may be distributed as follows :—**

1. Qualitative analysis	... 15
2. Organic detection	... 8
3. Volumetric analysis	... 15
4. Note book and fitting up of apparatus	... 5+7

### **SYLLABUS FOR THE B.Sc. PASS COURSE**

#### **ORGANIC CHEMISTRY**

**The growth and scope of Organic Chemistry.**

**Purification of Organic compounds (Solids and Liquids). Analysis of Organic compounds; Qualitative tests, quantitative estimation of carbon, hydrogen, nitrogen, halogens and sulphur. Determination of molecular weight of organic compounds, empirical and molecular formulas.**

**Constitution and Classification; Chemical constitution, linking of carbon atoms, classification of organic compounds, homologous series, nomenclature.**

**Aliphatic Hydrocarbons : Saturated : Paraffins up to and including 4 carbon atoms. The petroleum industry.**

**Unsaturated : Ethylene and acetylene.**

**Halogen derivatives of the Paraffins : Methyl and ethyl halides, reactions of alkyl halides, dihalogen derivatives—ethylene and ethylidene compounds, trihalogen derivatives of methane, carbon tetra chloride.**

**The alcohols : Preparations, properties and constitution of the alcohols, primary, secondary and tertiary alcohols, (up to 4 carbon atoms) fermentation, manufacture of methyl and ethyl alcohols.**

**The Ethers : Preparation, properties and constitution of the ethers, metamorphism, ethylether.**

**Aldehydes and ketones, preparation, properties and constitution of aldehydes and ketones, formaldehyde, acetaldehyde, Paraldehyde, chloral, acetone, condensation polymerisation.**

**The fatty acids : Preparation, properties and constitution of fatty acids, Formic acid, acetic acid, vinegar, propionic acid, butyric acid; Elementary ideas of oils, fats and waxes.**

**The acid chlorides, Anhydrides and amides.**

**Preparation of acetyl chloride, acetic anhydride and acetamide.**

**The esters—esters of organic acids, hydrolysis.**

**The amines : Primary, secondary and tertiary amines, quaternary ammonium compounds.**

**The Cyanogen Compounds : Cyanogen, hydrocyanic acid, nitriles, and isonitriles.**

**Organometallic compound of magnesium (not more than 3 applications of the reagent)**

**Derivatives of the unsaturated hydrocarbons : Allyl compounds, acrolein, acrylic acid**

**The Polyhydric alcohols : The glycols, ethylene glycol, ethylene oxide, glycerol (including its constitution), glycerol trinitrate.**

**Carbohydrates : Nomenclature, Glucose, fructose, and their constitution. Properties and manufacture of cane sugar, starch, cellulose, nitrocellulose, (Configuration of the carbohydrates is omitted).**

**Stereochemistry : Optical and geometrical isomerism of lactic, tartaric, maleic and fumaric acids : their preparation, properties and constitution, Resolution of tartaric acids.**

**Dibasic and tribasic acids : Preparation and properties of Oxalic acid, malonic acid, succinic acid and citric acid (including constitution).**

**The simple synthetic uses of malonic ester and acetoacetic ester (not exceeding four uses).**

**Carbonyl chloride, urea.**

**The aromatic hydrocarbons : Kekule's theory and structure of benzene (excluding electronic structures), properties of aromatic compounds; distillation of coal tar. Benzene, toluene and xylenes, their reactions and properties, Friedel-Crafts reaction, Fittig's reaction, Korner's absolute method of orientation.**

**The Aromatic halogen compounds : Monohalogen substitution products; chlorobenzene, bromobenzene, iodobenzene, benzyl chloride. Benzal Chloride. Benzo-trichloride and their properties.**

**The Aromatic nitro compounds mono-nitrobenzene, trinitrotoluene and their properties.**

The Aromatic amines : Properties and preparation of the following amino-compounds, aniline, methyl aniline, dimethyl aniline, toluidines, benzylamine and sulphanilic acid.

Preparation and Reactions of Diazo compounds (omitting constitution), Preparation and properties of Phenyl hydrazine and methyl orange.

The Sulphonic acids : Benzene sulphonic acids.

The Phenols : Preparation and properties of the phenols, mono-nitro-phenol, picric acid and anisole.

Aromatic alcohols, aldehydes and ketones : Benzyl alcohol, aromatic aldehyde-Benzaldehyde, aromatic ketones-acetophenone, benzo-phenone.

Phenolic aldehyde—Salicylaldehyde (Reimer-Tiemann reaction).

Aromatic Acids : Benzoic Acid, Benzoic anhydride, benzamide, benzoic esters, phenyl acetic acids, Cinnamic acid, Salicylic acid, acetyl salicylic acid.

### PHYSICAL CHEMISTRY

In addition to a fuller treatment of the subjects prescribed for the I A. and I.Sc. course, the following :—

Atomic theory, simple conception of atomic structure (including atomic number and isotopes), and electronic theory of valency (in outline), periodic classification of the elements. The kinetic theory of gases; deviations from gas laws, specific heats and ratio of specific heats, vander Waal's equation of state, continuity of state, the principle of corresponding states. The liquefaction of gases (elementary treatment). General properties of solutions : osmosis, osmotic pressure, molecular weight of dissolved substances, determination of lowering of vapour pressure, determination of relation between vapour pressure and osmotic pressure, ideal solutions static and dynamic methods of measuring vapour pressures, elevation of boiling point, laws of elevation of boiling point, depression of freezing points, limitation of the methods for the determination of molecular weights in solution, abnormal molecular weights.

Elements of thermochemistry : Hess's law of constant heat summation.

Chemical equilibrium : reversible and irreversible reactions, law of mass action, equilibrium in homogeneous systems; verification of the mass action. Le Chateliers' Theorem, homogeneous equilibrium in liquids, equilibrium in heterogeneous systems—phase rule as applied to one component system.

Elementary ideas of chemical kinetics : order of reaction, determination of the order of a reaction—saponification of ethyl acetate.

Elementary knowledge of homogeneous and heterogeneous catalysis, auto-catalysis, catalysis by enzymes, catalyst poisons, mechanism of catalytic reactions (elementary treatment).

Electrolysis and electrolytic dissociation; Electrolysis—Faraday's laws, Arrhenium theory of electrolytic dissociation, specific, equivalent and molar conductivity, measurement of conductivity of solutions, Transport number, Kohlrausch's law, strong and weak electrolytes, degree of dissociation—Ostwald's law of dilution, solubility product and its application in analytical chemistry, abnormality of strong electrolytes (theory of Debye-Hückel-Onsager is not to be taught). Strength of acids and bases—determination of strength of acids and bases, ionisation of water—ionic product of water, hydrolysis of salts, neutralisation, hydrogen ion concentration— $\text{pH}$ , determination of  $\text{pH}$ , buffer solution, indicators—theory of indicators (elementary treatment).

The colloidal state : crystalloids and colloids, classification of the colloids peptisation, lyophobic and lyophilic colloids, preparation of colloidal suspensions, Brownian movement, cataphoresis, coagulation of colloidal solutions and optical properties of colloidal solutions, protective colloids—gold number.

## INORGANIC CHEMISTRY

### *Theoretical*

1. Atomic theory; simple conception of atomic structure, atomic number, isotope (elementary idea, omitting separation); valency (elementary conception of electro-valency, co-valency, co-ordination valency); periodic classification of the elements.

2. Double and complex salts, Werner's theory (elementary ideas, excluding space-configuration and isomerism).

3. Methods of determination of equivalent weight, and atomic weight (including accurate determination of atomic weight—Stas' method)—Richard's method.

4. Application of law of mass action in analytical practices and industrial processes.

5. Study of the following elements and their chief compounds :

*Note.*—(a) Large-scale preparations, and winning of metals are included omitting technological and metallurgical details.

(b) Chief compounds comprise; Hydrides, halides, oxides and oxy-acids of non-metals, and hydrides, halides, oxides, hydroxides, sulphides, sulphates, nitrates and carbonates of metals.

(c) In addition to a fuller treatment of the subjects for the Intermediate course, specified topics are also to be studied.)

Helium, neon, argon, krypton and xenon (history of discovery of argon and helium, isolation, atomic weight, place in the periodic table.)

Oxygen, hydrogen, nitrogen (including water, air, hydrogen peroxide and ozone). Deuterium and its oxide (elementary study), Manufacture of ammonia and nitric acid. Hydrazine, Hydrazoic acid, hydroxylamine, nitrous and hyponitrous and (structure omitted.)

Flourine, chlorine, bromine, iodine and their hydrides (comparative study of properties). Oxides and oxy-acids of chlorine.

Sulphur, sulphurous and thiosulphuric acids (preparation and reactions), Sulphuric and (including physico-chemical principles of manufacture, but excluding theory of formation of chamber crystals).

Boron and silicon (omitting constitution of their hydrides, and of silicates), Glass.

Carbon. Coal gas; producer gas and water-gas (elementary) Carbides of silicon and calcium.

Phosphorus, arsenic.

Lithium, sodium, potassium, ammonium, copper, silver, gold, Calcium, strontium, barium, magnesium, zinc, cadmium, mercury, aluminium, tin, lead, antimony, bismuth, chromium, manganese, iron, cobalt and nickel.

*Note.*—Teaching should aim at correlation of properties on the basis of periodic classification. Simple valency bond structures of oxides and oxy-acids, and electronic structure of simple compounds (excluding resonance) are included.

*Paper I—Organic and Physical, Paper II—Inorganic and Physical questions are to be so grouped that marks may be distributed uniformly as far as possible among the three subjects.*

### *Practical*

Qualitative analysis of inorganic mixtures containing not more than three radicals from the following lists :—

Silver, lead, mercury, bismuth, copper, cadmium, arsenic, antimony, tin, iron, aluminium, chromium, zinc, manganese, cobalt, nickel.



calcium, strontium, barium, magnesium, sodium, potassium and ammonium, and their oxides, hydroxides, chlorides, bromides, iodides, fluorides, sulphates, sulphides, sulphites, thiosulphates, chromates, carbonates, phosphates, nitrites, nitrates and borates.

2. Detection of elements and detection of any one of the following groups in organic compounds :

$\text{NH}_2$ ,  $\text{NO}_2$ ,  $\text{OH}$ ,  $\text{CO}$ ,  $\text{COOH}$  and  $\text{COOC}_2\text{H}_5$

3. Acidimetry and alkalimetry, oxidation and reduction methods of volumetric analysis with potassium permanganate and potassium dichromate; iodimetry, gravimetric estimation of silver, iron and sulphate.

Distribution of Marks in the B.Sc. Pass Practical Examination.

Inorganic qualitative	...	...	...	30
Organic qualitative	..	...	...	20
Inorganic quantitative	...	...	...	30
Viva and Record		...	...	20
Total				100

Practical Note Books signed at regular intervals by the teachers are to be submitted; otherwise the candidate may be debarred from the examination.

### *Honours Course*

#### PAPER I

In addition to the topics for the pass course, the following should be studied :—

A detailed study of the following sections of organic chemistry is required.

Aliphatic compounds : Hydrocarbons : Saturated hydrocarbons up to five carbon atoms, petroleum—its cracking, simpler alicyclic hydrocarbons.

Unsaturated hydrocarbons : olefines, acetylenes, diolefines.

Halogen derivatives of hydrocarbons.

Alcohols : methyl, ethyl, propyl, butyl and amyl alcohols, theories of fermentation, allyl alcohol.

Fuller treatment of Polyhydric alcohols—glycols, glycerol.

Aldehydes and ketones; unsaturated aldehydes and ketones, e.g., acrolein, crotonic aldehyde, mesityl oxide and phorone.

Hydroxyaldehydes : Glycollic aldehyde—Preparation and Properties.

Dialdehydes : Glyoxal—its preparation and properties. Diketones, Diacetyl, acetyl acetone and acetonyl acetone—their preparation and Synthetic uses.

Monocarboxylic acids and Dicarboxylic acids including glutaric, adipic, pimelic and suberic acids.

Stereochemistry : Optical and geometrical isomerism (in details) Walden inversion.

Halogen substituted acids: Mono—, di—, and trichloro acetic acids

Hydroxy acids : Malic, Keto acids, pyruvic, acetoacetic and levulinic acids.

Amino acids : Glycine, alanine.

Elementary ideas about proteins.

Constitution of Cyanides, isocyanides, preparation and uses of diazomethane and guanidine.

Organometallic compounds of zinc and magnesium.

Thio alcohols, thio ethers, sulfoxides and sulphones, thioures, thiocyanic acid.

Carbohydrates—monosaccharides—configuration of the monosaccharides. Synthetic methods in the chemistry of monosaccharides, detection of sugars. Disaccharides—sucrose, lactose, maltose (proof of structure not required).

Benzene and its homologues.

Structure of benzene—with the concept of resonance.

Diphenyl methane, triphenylmethane and free radicals, naphthalene, anthracene.

Halogen derivatives, sulphonic acids and nitro derivatives of aromatic hydrocarbons, preparation and constitution of naphthalene and anthracene.

Aromatic alcohols, phenols, ethers and naphthols, alizarin and quinizarin.

Aromatic amines, diazo and azo compounds, azo dyes and naphthyl amines.

Aromatic aldehydes, ketones and quinones—amines and anthra-quinones.

Aromatic monocarboxylic acids and their derivatives; halo, nitro, amino—and hydroxy substituted aromatic acids, phthalic acids and their derivatives and coumarin.

Preparation and properties of pyridine, quinoline, isoquinoline, indole. Preparation, constitution and uses of indigo.

Syntheses and uses of the following: Malachite green, Fluorescein, magenta, alizarin, eosin and phenolphthalein.

In addition to the reactions which are necessary for the preparation of the above compounds elementary study of the following reactions with two examples in each case:

1. Reformatsky's reaction
2. Knoevenagel reaction
3. Michael reaction
4. Hoesch's reaction
5. Gatterman's reaction.

The student should be capable of devising possible syntheses of compounds (not necessarily mentioned in the text books) involving above reactions.

Detection of the following (omitting estimation) groups:—

—OH, NH, NHR, NO<sub>2</sub>, COOH, CO<sub>2</sub>Et, CHO, CO, —CN, R—O—R,

## PAPER II

### INORGANIC CHEMISTRY

#### 1. Radio-activity, Structure of the atom.

Elementary idea of Nuclear constitution; atomic number, isotope. Artificial transmutation, artificial radio activity, simple concept of nuclear fission.

Valency; electronic theory of valency, electro-valency, co-valency, metallic bond, co-ordination valency.

Complexes—perfect and imperfect; Werner's theory, (including space configuration and isomerism of inorganic complexes, inner metallic complexes).

#### 2. Modern methods of determination of atomic and molecular weights.

3. Study of the following elements and their principal compounds—Selenium, tellurium, caesium, rubidium, radium, uranium and platinum.

4. Fuller treatment of the elements and their compounds in the pass syllabus, including the following topics:—

Compounds of inert gases, Forms of hydrogen. Hydrides, Oxides. Peroxides and persalts (e.g. of boron, carbon, sulphur and chromium). Nitrides, Amides.

and acid amides (of sulphur, phosphorus, nitrogen and carbon) Calgon, Oxides and oxyacids of chlorine, bromine and iodine. Chlorides, sulphides, carbides, carbonyls. Reactions in liquid ammonia and liquid sulphur dioxide.

Abnormal valency compounds of metals (only those included in the course need be treated).

Binary alloys, amalgams.

Electronic concept of oxidation and reduction.

Application of Red-ox potentials to the field of inorganic chemistry.

Indicators—choice of indicators—pH and pK values. The teaching should aim at correlation of properties of Elements on the basis of the periodic table, atomic structure, atomic and ionic volumes.

### *Paper III*

## PHYSICAL CHEMISTRY

Detailed treatment of the topics included in the Pass course syllabus, to which the following are specially added :—

(i) Gases :—Kinetic theory of gases, ideal gas equation, and derivations of the same; Maxwell's distribution of velocities (without derivation), Collision number.

Equations of state—Van der Waal's, Dieterici and Berthelot's equations and their limitations.

Critical states—Equation of corresponding states. Specific heats and Viscosity of gases.

Determination of molecular weights of gases—limiting densities—dissociation.

Principles of liquefaction.

(ii) Liquids :—Molar volumes—Surface tension—association of liquids—Parachor Viscosity of Liquids—elementary ideas of molar refractive index and dipole moment.

(iii) Solids : Specific heat of solids, isomorphism, elements of crystal structure. Bragg's analysis of NaCl and KCl.

(iv) Energetics : Elementary treatment of First and Second laws of thermodynamics. Carnot's cycle & Carnot theorem Kelvin scale of temperature, specific heat relations—thermo-chemistry. Joule-Thomson effect. Kirchhoff's equation, Clausius-Clapeyron equation, Gibb's—Helmholtz equation. Concepts of entropy, free-energy-Gibb's potential and their simple relations.

Application of thermodynamic principles to simpler problems in solutions chemical equilibrium, E.M.F. of cells etc.

(v) Dilute solutions : Osmotic pressure, lowering of vapour pressure and freezing points, elevation of boiling points and their relations. Determination of molecular weights from the above.

(vi) Colloidal State : Colloids—Classification and general methods of preparation, dialysis. Special properties of colloids. Explanation of colloidal charges and mechanism of coagulation.

Brownian motion.

Determination of Avogadro number—from Brownian movement, from electronic charge, from radioactivity.

(vii) Equilibrium : Law of mass action and its application to homogeneous reactions. Methods of determination of the equilibrium constant. Heterogeneous reactions. Vant Hoff isotherm and isochore—Le Chatelier principle.

(viii) Catalysis : Catalytic reactions—classification—criteria of catalysed reaction—application to industrial process.

Theories of catalysis—Theory of adsorption—Langmuir & Frensdorff isotherms : Special types of catalysis—enzyme catalysis, acid-base catalysis.

(ix) Chemical Kinetics : Order of reaction—equations of Zero, first and second order reactions, Methods of the determination of the order. Arrhenius equation and mechanism of chemical changes. Autocatalytic and induced reactions.

Simple side—Consecutive reactions.

Elementary ideas of photochemistry : Beer's and Lambert's Law, Einstein's Law. Molar extinction co-efficient. Photosensitisation—chain reaction.  $H_2$ — $Br_2$  reaction.

(x) Phase rule : Phase rule equation : Harnett distribution law. Application of phase rule to the following systems.

(i) (a) water (b) sulphur (c) Carbon dioxide

(ii) aqueous solutions of  $KCl$ ,  $Na_2SO_4$ , and  $FeCl_3$

(iii) Alloy system. e.g. Tin & Lead Silver and Copper.

(iv) Miscibility and distillation of binary liquid mixtures

(v) Thermal analysis of two component systems stated above.

(xi) Electrochemistry :—Theories of electrolytic dissociation—Faraday's laws.

Determination of transport number and conductance of solutions.

Strong and weak electrolytes—Qualitative treatment of Debye-Huckel theory.

Kohlrausch's Law.

Determination of velocity of ions.

Application of conductance measurements.

Ostwald dilution Law—strength of acids & bases—solubility product—hydrolysis—ionic product of water—modern concept of acids & bases.

Theory of indicators (neutralisation).

Hydration of ions (treated qualitatively).

(xii) Electromotive force : Electrode potentials, electromotive series, E.M.F., of cells.

Concentration cells, galvanic cells, Daniel cell, Weston cell, Leclanché and alkali accumulators.

Application of Gibbs's—Helmholtz equation.

Redox potential—Oxidation-reduction series— $Fe^{++}$ — $Fe^{+++}$ ,  $Hg^+$ — $Hg^{++}$  quinhydrone.

Application of E.M.F. measurements.

Buffer solutions—determination of pH.

Decomposition potential—polarisation and overvoltage.

(xiii) Radioactivity Atomic structure—Elementary ideas, radioactive radiation, disintegration theory of Rutherford, Soddy's Law.

Uranium series only.

Uses of spectroscopic methods in Chemistry.

#### Paper IV

### HISTORY OF CHEMISTRY & GENERAL & ANALYTICAL CHEMISTRY

History of Chemistry—Lives and short accounts of the work of the following chemists :—

Emil Fischer, Kekulé, Lavoisier, Mendeleeff, Arrhenius, Pasteur, Van Hoff and P. C. Ray.

Water—for industrial and domestic purposes

Fuels—Wood, charcoal, coal, coke, oil, natural gas, coal gas, water gas and producer gas.

Industrial gases—hydrogen, oxygen, nitrogen, carbon dioxide, dry ice, recovery of sulphur dioxide from waste gases, acetylene and its industrial uses.

Industrial carbon, lampblack, carbon black, activated carbon, graphite—natural and synthetic.

Fertilizers—Potassium salts, cyanamide, synthetic ammonia, ammonium salts, urea, sodium nitrate, phosphatic fertiliser.

Sodium and its compounds of industrial use.

Electro-chemical and electro-thermal industries :—aluminium, magnesium, potassium chlorate and perchlorate, calcium carbide, artificial abrasives.

Sulphur industries—mining and refining, recovery of sulphur from waste gases.

Sulphuric acid—Chamber and different contact processes and also from gypsum; sulphur problem in India.

Nitric acid—Synthetic, from sodium nitrate, salt cake and its disposal for useful purposes.

Chlorine—hydrochloric acid from salt and synthetic, hypochlorites, the problem of chlorine utilisation, liquid chlorine and its industrial uses.

Paints and inorganic pigments :—Zinc white, white lead, lead Chromate, red lead, rouge, chromegreen and Ultramarine.

General knowledge—Oils, fats and waxes—Vegetable oils, animal oils, and fats, waxes, hydrogenation of oils, soap for laundry and industrial purposes, recovery of glycerine.

Sugar and starch industries—Manufacture of cane sugar, utilisation of molasses and bagasse; manufacture of starch from different sources.

Fermentation industries—Industrial alcohol from different raw materials; acetone and butyl alcohol; vinegar, citric and lactic acids.

Wood chemicals—Distillation of wood, recovery of by-products.

Synthetic production of methanol, formaldehyde and acetone.

Elementary ideas on Synthetic Fibre, Synthetic plastics and Synthetic rubber.

Petroleum industry—Constituents of crude oil and natural gases, distillation of crudes, cracking, refining of petroleum, high-octane petrols, antiknock compounds.

Preparation of Fuchsine, indigo, alizarine, and Bismark brown—and principles of Dyeing.

Metallurgy—iron, copper, lead, zinc, tin, aluminium, magnesium, nickel, gold, silver, (excluding engineering details), manufacture of steel by different processes, alloy steels, binary non-ferrous alloys.

Application of :—Law of mass action; Red-ox potentials—overvoltage; concepts of acids, bases and their relative forces in analytical chemistry.

(Practical)

## INORGANIC CHEMISTRY.

Qualitative. Analysis of mixtures containing not more than four radicals basic or acidic, selected from the list included in the pass syllabus and the following : ferre and ferricyanide, chlorate, bromate, iodate, sulphocyanide, arsenate hypophosphite and silicate.

Semi-micro methods should be introduced in qualitative analysis.

Quantitative :—(a) Volumetric analysis—as in the pass syllabus, with the addition of argentometric method.

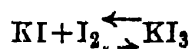
(b) Gravimetric estimations of silver, lead, iron, zinc, manganese, barium, calcium, magnesium, chloride and sulphate.

Gravimetric experiments should be done in Gooch or sintered crucibles.

(c) Estimations of mixtures of iron and calcium, iron and copper, iron and manganese, copper and zinc silver and copper, calcium and barium, calcium and lead, calcium and magnesium.

#### Physical

1. Molecular weights by Victor Meyer's method,
2. Density, surface tension of liquids by drop method,
3. Viscosity by Ostwald's viscometer
4. Partition co-efficient of iodine between water and benzene.
5. Study of equilibrium of the system.



by (a) solubility method ;

(b) partition co efficient method

6. Adsorption of acetic acid by charcoal
7. Preparation of a buffer solution—acetic acid and acetate—by determination of pH by indicator.

#### Organic

1. Detection of elements in Organic compounds. Identification of a simple solid compound containing one of the following groups and the preparation of their derivatives :

OH. NO<sub>2</sub>. NH. NHR, COOH. CO<sub>2</sub> Et. > OC

After identification a derivative should be prepared.

2. Preparation of (a) ethyl bromide, (b) iodoform, (c) p-and o-nitraniline, (d) acetyl derivative of an amine or a phenol and (e) simple esters.

The substance is to be selected from the following organic compounds :—

Name of the compound containing —OH group	Melting point	Boiling point
1. Methyl alcohol	...	65°
2. Ethyl "	...	78°
3. Isopropyl "	...	83°
4. Iso amyl "	...	131°
5. Cyclo hexanol	...	161°
6. Benzyl alcohol	...	205°
7. Glycerol	...	290°
8. m-cresol	...	202°
9. Guaiacol	28°	...
10. O-cresol	31°	...
11. P-cresol	35°	...
12. Phenol	42°	...
13. α naphthol	94°	...
14. Catechol	104°	...
15. Resorcinol	118°	...
16. β-naphthol	122°	...
17. Hydroquinone	169°	...
18. Phloroglucinol	218°	...

Name of the compound containing	Melting point	Boiling point
—NO <sub>2</sub> group		
19. Nitrobenzene	...	210°
20. O-nitrotoluene	...	220°
21. m-nitrotoluene	...	230°
22. p-nitrotoluene	54°	...
23. m-dinitrobenzene	90°	...
24. 1 : 3 : 5 trinitrobenzene	122°	...
25. P-nitro phenol	114°	...
26. Picric acid	122°	...
—NH <sub>2</sub> group		
27. Aniline	...	183°
28. O-toluidine	...	197°
29. m-toluidine	...	199°
30. p-toluidine	45°	...
31. α-Naphthylamine	50°	...
32. m-phenylenediamine	63°	...
33. O-phenylenediamine	102°	...
34. β-Naphthylamine	111°	...
35. p-phenylenediamine	140°	...
36. p-anisidine	57°	...
—NHR group		
37. Diethylamine	...	55°
38. Methylaniline	...	193°
39. Ethylaniline	...	205°
40. Benzylaniline	57°	...
—NHR group		
41. Diphenylamine	54°	...
42. Dibenzylamine	...	...
43. Acetanilide	114°	...
44. Benzanilide	161°	...
45. P-amino acetanilide	163°	...
—COOH		
46. Acetic acid	...	118°
47. Propionic acid	...	140°
48. Isobutyric acid	...	155°
49. Phenyl acetic acid	70°	...
50. Oxalic acid	101°	...
—COOH group		
51. O-toluic	102°	...
52. m-toluic	109°	...
53. Benzoic acid	121°	...
54. Malonic acid	133°	...
55. p-toluic	177°	...
56. Anisic acid	184°	...
57. Succinic acid	185°	...
58. Phthalic acid	195°	...
59. Acrylic acid	...	110
60. Cinnamic acid	133°	...
61. Citric acid	100°	...
62. Tartaric acid	160°	...
63. Salicylic acid	155°	...

64. p-hydroxy benzoic acid	...	218°	...
65. Maleic acid	...	189°	...
66. Phenyl glycine	...	196°	...
67. Anthranilic acid	...	144°	...
—COOEt <sub>2</sub> group and —COOMe group			
68. Ethyl acetate	...	...	77°
69. Ethyl isovalerate	...	...	134°
70. Ethyl isobutyrate	...	...	110°
71. Isoamyl acetate	...	...	139°
72. Ethyl oxalate	...	...	186°
73. Ethyl malonate	...	...	198°
74. Ethyl benzoate	...	...	213°
75. Benzyl acetate	...	...	216°
76. Ethyl phenyl acetate	...	...	229°
77. Ethyl cinamate	...	...	217°
78. Methyl phthalate	...	...	252°
79. Ethyl phthalate	...	...	298°
80. Methyl cinnamate	...	6°	...
81. Ethyl p-amino benzoate	...	89°	...
82. Ethyl p hydroxy benzoate	...	116°	...
83. Ethyl anthranilate	...	...	205°
84. Methyl salicylate	...	...	...
C=O group			
85. Benzaldehyde	...	...	179°
86. Salicylaldehyde	...	...	196°
87. Cinnamylaldehyde	...	...	220°
88. Vanillin	...	80°	...
89. Acetone	...	...	56°
90. Methyl ethyl ketone	...	...	80°
91. Mesityl oxide	...	...	130°
92. Acetyl acetone	...	...	139°
93. Cyclohexanone	...	...	155°
94. Acetophenone	...	...	202°
95. Phorone	...	28°	...
96. Benzalacetone	...	41°	...
97. Benzoylacetone	...	...	...
98. Benzophenone	...	48°	...
99. Benzil	...	95°	...
100. Methyl β-naphthyl ketone	...	51°	...
101. Methyl α-naphthyl ketone	...	...	...
102. m-nitrobenzaldehyde	...	58°	...
103. Piperonal	...	37°	...

Note.—The examination will be a three day one of six hours' duration each day.

#### Distribution of marks :—

1. Inorganic qualitative analysis	...	5 × 10 = 50
2. Organic analysis (qualitative)	...	30
3. Quantitative analysis (inorganic)	...	60
4. Organic Preparation	...	20
5. Physical	...	20
6. Oral (on principles of analytic procedure) and recording	...	20
		<hr/> 200

Practical Note Books signed at intervals by the teachers are to be submitted; otherwise the candidate may be debarred from the examination.



## CHAPTERS XXXV &amp; XXXVI

The following revised syllabuses in Physiology for the Intermediate, B.A. and B.Sc. Examinations were adopted :—

**REVISED SYLLABUS IN PHYSIOLOGY****INTERMEDIATE EXAMINATIONS****(PHYSIOLOGY)****Distribution of Papers**

*Theoretical Paper I*—Characteristics of Life—Blood and its Circulation, Respiration, Kidney and Secretion of Urine, Skin.

*Theoretical Paper II*—Nervous System, Sense Organs, Endocrine Organs, Digestion, Absorption, Metabolism, Elementary Biochemistry. Nerve Muscle Physiology.

*(Theoretical)***(1) Introduction—**

Characteristics of living matter—amoeba.

**(2) Structural Basis of Body—**

Cell—its structure and functions.

Tissues and organs.

General plan of the human body.

**(3) Digestion, Absorption, Metabolism, Nutrition, Dietetics—**

The alimentary canal.

Digestion in mouth, stomach and intestines.

The composition and action of digestive juices.

Liver and its functions.

Absorption of digested foodstuffs from the alimentary canal.

Fate of absorbed foodstuffs.

Elementary knowledge of chemical composition of foods.

Normal diet.

**(4) Blood and its Circulation—**

Blood—its general composition.

Function of red blood corpuscles and of white blood corpuscles—Coagulation of blood.

The circulatory system—course of circulation—Anatomy of the heart—characteristics of cardiac muscle—cardiac cycle—action of valves—heart sound—nervous regulation of heart—apex beat. Vascular system—structure of arteries, capillaries and veins—elementary principle of circulation—arterial blood pressure—arterial pulse—elementary knowledge of vasomotor control. Lymph its composition, and functions. Spleen and its functions.

**(5) The Respiratory System—**

The organs of respiration.

Mechanics of respiratory movements—quantity of air breathed. Chemistry of respiration—inspired air—expired air—alveolar air—external and internal respiration. Regulation of breathing—apnoea and asphyxia.

**(6) Kidney—**

Elementary knowledge of structure of kidney and its function. Formation of urine—principal constituents of urine.

**(7) Skin—**

Skin—its structure and functions.  
Regulation of body temperature.

**(8) Physiology of Movement—**

Contraction of muscles—method of recording muscular contraction.

**(9) The Nervous System—**

General view of the nervous system. The neurone—afferent and efferent nerves. Spinal cord—its structure—anterior and posterior roots. Functions of spinal cord—reflex action.

Cerebellum and cerebrum.

**(10) The Sense Organs—**

Cutaneous sensations. Vision—anatomy of the eye—the optical system—errors of refraction—function of iris—mechanism of accommodation. Hearing—anatomy of the ear—conduction of sound waves from air to internal ear.

**(11) The Endocrine Organs—**

Elementary knowledge of structure and function of Thyroid, Pituitary body, Pancreas and Suprarenal.

**(Practical)****HISTOLOGY**

The microscope—its use and care.

Examination of milk, unicellular organisms and starch granules.

Examination of frog's blood and of human blood.

Preparation, staining and examination of blood film.

Preparation and examination of elementary tissues—squamous, columnar, cubical and ciliated epithelium, muscles, medullated nerve fibres.

Preparation of areolar and adipose tissues by spreading.

Examination of bones, cartilage and liver.

**BIOCHEMISTRY**

Simple tests and identification of starch, dextrine, cane sugar, glucose, lactose and maltose, proteins and peptone.

Salivary digestion.

Examination of milk, flour and egg.

**Demonstration**

Capillary circulation in frog's mesentery.

Myographic recording of muscular contraction.

Enumeration of corpuscles of blood.

Estimation of haemoglobin.

Emulsification and saponification of fat.

The laboratory note books of candidates shall be examined and marked by examiners. Note books which have not been signed at frequent intervals by the Professors under whom the candidates worked will not be accepted.

## REVISED SYLLABUS IN PHYSIOLOGY

### B.A. AND B.Sc. EXAMINATIONS

#### PHYSIOLOGY

#### Distribution of Papers

##### (Pass)

*Theoretical Paper I*—Blood and its Circulation, Respiration, Kidney, Skin, Regulation of Body temperature and Sense organs.

*Theoretical Paper II*—Endocrine Organs, Nervous System, Nerve Muscle Physiology, Biochemistry, Alimentation and Metabolism, Reproduction.

*Practical Paper*—Histology, Experimental Physiology and Biochemistry.

##### (Honours)

*Theoretical Paper I*—Blood and its Circulation, Respiration, Lymph and Tissue Fluid.

*Theoretical Paper II*—Biochemistry, Digestive System, Metabolism, Nutrition and Dietetics.

*Theoretical Paper III*—Endocrine Organs, Kidney, Skin and Regulation of Body Temperature and Reproduction.

*Theoretical Paper IV*—Nervous System, Sense Organs and Nerve Muscle Physiology.

*Practical Paper V*—Histology, Biochemistry and Experimental Physiology (Biophysics).

*Practical Paper VI*—Histology, Biochemistry and Experimental Physiology (Biophysics).

#### DETAILED SYLLABUS

##### Pass Course

##### *Theoretical*

##### (1) (a) *Structural Basis of Body*—

The Cell—its structure and differentiation.

Elementary tissues—their structure and function.

Structure of living matter—functional characteristics of living matter.

##### (b) *Biochemical and Biophysical Basis of Life*—

Chemistry of carbohydrates, lipids and proteins.

Catalysis and enzyme action.

Chemistry of body fluids and excretion—reaction of body fluids.

Elementary knowledge of diffusion, dialysis, osmosis, colloidal state of matter and permeability of membranes.

##### (2) *Dietetics, Nutrition, Digestive System and Metabolism*—

The digestive organs—their structure and function. Movements of the alimentary canal. Digestion and absorption of foodstuffs—composition, action and mechanism of secretion of digestive juices—gastrointestinal hormones. Metabolism of carbohydrates, proteins and lipids. Large intestine, its structure and functions. Liver, its structure and function. Bile, its composition, formation, circulation and function.

Basal metabolism—its determination and factors influencing it.

Vitamins—fat soluble and water soluble—their sources, functions, requirements and deficiency signs.

Mineral metabolism—normal mineral requirements.

Water balance of the body.

Normal diet—essential amino acids, Composition of eggs, meat, fish, milk, rice, wheat and pulses. How to formulate diets of an adult.

### (3) *The Circulatory System—*

#### Blood—

General composition of blood.

Origin, fate and functions of red blood corpuscles, white blood corpuscles and blood platelets.

Haemoglobin—its function, derivatives and compounds—method of estimation.

Coagulation of blood—factors that hasten and retard coagulation—coagulation and bleeding time.

Plasma proteins—their origin and functions.

Elementary knowledge of the general principles of immunity.

#### CIRCULATION—

The course and Anatomy and histology of the heart—properties of cardiac muscle—origin and propagation of cardiac impulse.

Cardiac cycle—sequence of events action of valves—heart sounds—apex beat—nutrition of heart and coronary circulation—cardiac reflexes—innervation of heart—regulation of heart beat—cardiac output—method of its determination in man.

#### VASCULAR SYSTEM—

Haemodynamics of circulation—structure of arteries, capillaries and veins and circulation through them—pulse, arterial and venous—velocity of blood flow—circulation time—innervation of blood vessels and control of circulation—arterial blood pressure—its regulation and determination.

#### HAEMOLYMPHATICS SYSTEM—

Spleen—its structure and functions. Reticuloendothelial system  
Lymph and tissue fluids.

### (4) *The Respiratory System—*

Anatomy and histological structure of respiratory organs. Mechanism of respiratory movements—spirometry. Chemistry of respiration—composition of inspired, expired and alveolar air. Gases in blood and their tension—transport of oxygen and carbon dioxide in blood—Mechanism of internal and external respiration. Regulation of respiration. Effects of respiration on circulation. Abnormal respiration—Cheyne strokes respiration—apnoea, dyspnoea, asphyxia, anoxia. Effect of high and low atmospheric pressure on breathing—mountain sickness—Caisson disease. Artificial respiration.

### (5) *The Urinary System—*

Kidney—structure and function of kidney and a nephron. Renal circulation. Formation and composition of urine—normal and abnormal constituents. Physiology of micturition.

### (6) *Skin and Regulation of Body Temperature—*

Structure and functions of skin. Composition and formation of sweat. Body temperature and its regulation.

**(7) Physiology of Movement—**

Nerve muscle physiology—Different types of muscles in the body and their structure—changes in a muscle on excitation. Excitation process in a nerve and its propagation—electrical changes.

**(8) The Nervous System—**

General features of the nervous system. Neurones and their connections—synapses.

Structure and function of the spinal cord—Reflex action—classification and properties—reciprocal innervation—co-ordinated movements. Roots of the spinal nerves and their functions and lesions—ascending and descending tracts—upper motor neuron and lower motor neuron—section of the spinal cord.

Structure, and functions of medulla, pons, midbrain—corpus striatum—thalamus—hypothalamus—internal capsule—cerebellum and cerebrum. Localisation of function of the cerebral cortex—elementary knowledge of conditioned reflex.

Autonomic nervous system—general arrangement and activities of the sympathetic and parasympathetic nervous systems.

**(9) The Sense Organs—**

Classification of sensations—exteroceptive, proprioceptive and interoceptive sensations.

(a) Vision—Anatomy of the eye—optical system—errors or refraction—structure and function of iris—mechanism of accommodation—structure and function of retina—changes in retina when exposed to light—visual field—perimetry—visual pathway—visual reflexes. Elementary knowledge of colour vision.

(b) Hearing—Anatomy of the ear—Helmholtz's theory of hearing—nervous pathways of hearing.

(c) Sensations of Taste and Smell—structure and functions of receptor organs.

(d) Cutaneous and deep sensations and their receptors.

(10) Voice and Speech—Structure of the larynx—production of voice and speech.

**(11) The Endocrine Organs—**

Structure and general functions of—Thyroid—Parathyroid—Suprarenal—Islets of Langerhans—Pituitary—Gonads.

**(12) Reproduction—**

Secondary sex characters—menstruation—ovulation—fertilisation—oestrous cycle—placenta and its functions—physiological changes in pregnancy—structure of mammary gland and hormonal control of its development and secretion.

**Practical****HISTOLOGY**

The microscope—its use and care.

Examination of fresh tissues and blood.

Preparation and staining of blood films.

Preparation of haemin crystals.

Histological examination by teasing—preparation of nerve and muscle fibres by teasing and staining.

Histological examination by spreading—silver nitrate preparation of mesentery and bladder.

**Staining and mounting of sections and their examination—cartilage, bone, muscle, trachea, lungs, oesophagus, stomach, intestine, salivary glands, pancreas, liver, kidney, spinal cord, cerebrum, cerebellum, lymph glands, suprarenal, spleen, thyroid.**

**Haemocytometry and Haemoglobinometry.**

#### EXPERIMENTAL PHYSIOLOGY (BIOPHYSICS)

- (1) Dissection of a frog.
- (2) Effects of make and break shocks on frog's muscle—elasticity and excitability of muscle.
- (3) Simple muscle curve—effects of load and temperature on frog's muscle.
- (4) Effect of two successive stimuli—summation of contractions—tetanus.
- (5) Fatigue of frog's muscle.
- (6) Recording of frog's heart beat. Effect of temperature on heart.
- (7) Records of respiratory movements in man.
- (8) Use of sphygmomanometer.
- (9) Spirometry. (Demonstration)
- (10) Demonstration of Reflexes in man.

#### BIOCHEMISTRY

- (1) Simple chemical tests and identification of starch, dextrin, glucose, cane sugar, lactose, maltose, fructose, protein, gelatin, peptone, lactic acid, dilute hydrochloric acid in gastric juice, urea and uric acid.
- (2) Emulsification and saponification of fat.
- (3) Examination of urine—reaction of urine—tests for acetone, albumen, sugar, urea, uric acid, bile salts and pigments, indican.
- (4) Simple experiments on salivary, peptic and pancreatic digestions.
- (5) Qualitative chemical analysis of some simple foodstuffs—milk, flour, egg, rice, potato, etc.
- (6) Quantitative estimation of chloride, phosphate, dextrose and urea.
- (7) Spectroscopic examination of haemoglobin and its derivatives. (Demonstration)

The laboratory note books of candidates shall be examined and marked by examiners. Note books which have not been signed at frequent intervals by the Professors under whom the candidates worked will not be accepted.

#### Honours Course

##### *Theoretical*

In addition to a more complete and detailed study of the subjects prescribed for the Pass Course, the following :—

*Energy of molecules and ions in solution*—Diffusion, filtration, ultrafiltration, dialysis, semipermeable membranes, osmotic pressure—its measurement—normal physiological solutions.

Surface energy—Heat formation and free energy—energy rich bonds—colloidal state of matter—properties of colloids—properties of gels—properties of hydrosols—optical behaviour of hydrosols—electrical properties of colloids—electrophoresis—adsorption—colloidal ions—combination between colloids—coagulation of colloids.

Passage of water and solutes across membranes—Permeability of membranes, hydrostatic pressure, electrical difference of potential, membrane equilibria—hydrogen ion concentration and its regulation—buffer systems—measurement of pH—Bioelectric potentials—Oxidation reduction systems.

### *Dietetics, Nutrition, Digestive System and Metabolism—*

Basal metabolism—methods of determination—energy balance sheet of the body—influence of state of nutrition on metabolism—undernutrition—starvation and obesity—metabolism under different condition of nutrition—effect of foodstuffs on metabolism—specific dynamic action—effect of muscular work on metabolism.

Carbohydrate metabolism—maintenance of blood sugar level—glycosuria—hormonal control of carbohydrate metabolism. Metabolism of lipids. Metabolism of nucleoproteins—purine and pyrimidine bases—creatinin and creatin—their origin, fate and function—special aspects of protein metabolism—transamination—transmethylation—deamination—transsulphuration—metabolism of individual amino acids like glycine, serine, phenylalanine, tyrosine, tryptophane and methionine—metabolic inter-relationship—tricarboxylic acid cycle—detoxication. Metabolism of sulphur, iron, calcium, phosphorus, cholesterol—trace elements—use of isotopes in metabolic studies. Enzymes—kinetics—activators—co-enzymes—classification of enzymes. Normal requirements of various kinds of foods.

### *Blood and Circulation—*

Volume of blood in the body—its regulation and determination. Plasma proteins—their origin, fractionation and function. Constancy of blood pH. Cytology of erythrocytes—mean corpuscular volume—mean corpuscular haemoglobin—mean corpuscular haemoglobin concentration—colour index—enumeration of reticulocytes—suspension stability of red blood cells—blood groups—fragility of red blood corpuscles. Prothrombin time.

Regulation of coronary flow—electrocardiogram—heart block—auricular flutter and fibrillation—output of heart—origin and propagation of cardiac impulse—adaptation of cardiac activity—metabolism of cardiac muscle—venous pulse—circulation time in man—intracardiac pressure—blood pressure and its regulation—control of veins and capillaries. Cerebral, pulmonary, hepatic, renal and foetal circulation.

### *Respiration—*

Determination of gaseous metabolism—methods of gas analysis in blood and air—respiratory quotient—regulation of breathing—blood pressure and breathing—dissociation curves of blood gases—ionic interchange between corpuscles and plasma—tissue oxidation.

### *Kidney—*

Methods of determination and significance of clearance values of various substances by the kidney—action of antidiuretic hormone on the kidney.

### *Physiology of Movement—*

Physiology of muscular exercise. Intimate nature of muscular contraction and nervous excitation—changes undergone by a nerve during activity—neuromuscular junction and its properties—transmission of impulse across neuromuscular junction. Degeneration and regeneration of nerves. Chemical transmission of nervous impulses—Autonomic drugs.

### *Nervous System—*

Muscle tone—postural reflexes—regulation of posture. Vestibular apparatus—its connections and functions. Conditioned reflexes. Suppressor and facilitatory areas in cerebral cortex and subcortical centers—Electroencephalograph. Cerebrospinal fluid, its origin, composition, circulation, function and fate.

### *Sense Organs—*

Nutrition and protection of the eye—subjective phenomenon of colour vision—contrast phenomena—theories of colour vision—binocular vision.

Theories of hearing—cochlear response. Aphasia. Nervous pathways of taste and smell. Cutaneous and kinesthetic sensations. Laws of sensation—Sleep and hypnosis—Consciousness.

### *Hormones—*

Elementary knowledge of chemistry of hormones and their mode of action. Inter-relation of endocrine organs.

*Reproductive Organs*—Development of fertilised ovum—germinal membranes—hormones of the placenta. Mammary gland, its structure and development, factors influencing the development and control of its secretion. Parturition.

### *Practical*

In addition to the Pass Course the following :—

#### EXPERIMENTAL

- (1) Determination of the velocity of nerve impulse in frog's nerve.
- (2) Electrotonus (demonstration).
- (3) Genesis of tetanus.
- (4) Indefatigability of nerve.
- (5) Stannius' ligature and experiments on properties of heart muscle.
- (6) Vagus stimulation of frog's heart.
- (7) Effects of ions and drugs on frog's heart-beat. (By perfusion).
- (8) Pulse tracing.
- (9) Use of sphygmomanometer.
- (10) Determination of coagulation time by capillary method.
- (11) Demonstration of B. M. R. in man.

#### HISTOLOGY

- (1) Cutting of sections by freezing method.
- (2) Staining of sections by different staining methods and making of permanent preparations.
- (3) Counting of blood corpuscles.
- (4) Determination of M.C.V., M.C.H., M.C.H.C.
- (5) Determination of size of microscopic objects.

#### BIOCHEMISTRY

- (1) Estimation of total Carbohydrate in a foodstuff.
- (2) Identification of sugars by osazone crystals.
- (3) Quantitative estimation of—
  - (a) Ammonia, Nitrogen in urine by Formol titration method.
  - (b) Sulphate.
  - (c) Lactose in milk.
  - (d) Cane sugar.
- (4) Determination of blood chloride.

Laboratory note books of candidates shall be examined and marked by examiners. Note books which have not been signed at frequent intervals by the Professors under whom the candidates worked will not be accepted.



## CHAPTER XXXVI

The following revised syllabus in Psychology for the B.A. and B.Sc. examinations were adopted :—

**SYLLABUS FOR THE B.A. AND B.Sc. EXAMINATIONS IN PSYCHOLOGY  
(PASS AND HONOURS)**

**PASS COURSE (THREE PAPERS : TWO THEORETICAL, ONE PRACTICAL)**

*Paper I—General Psychology*

1. Introduction : The subject-matter, scope and methods. Relation between body and mind—psychophysical parallelism and interactionism.
2. The Nervous system : Neurone and its branches, reflex arc, synapse. Main functions of Spinal Cord, Cerebellum and Cerebrum.
3. The stand-point of the Structural school of psychology : Conception of psychical elements and their combinations, mental analysis, introspection.
4. Sensations : Attributes. Classification.
  - Visual : Structure and function of eye. Facts and theories of colour and light visions. Laws of colour vision.
  - Auditory : Structure and function of ear. Tones and their combinations. Consonants and Dissonants. Theories.
  - Cutaneous : Sense organs of pressure, pain and temperature sensations. Paradoxical sensation of cold. Protopathic and epicritic sensibility.
  - Olfactory : Sense organ. Classification of smells. Phenomena of compensation. Rivalry and adaptation.
  - Gustatory : Sense organ. Taste mixture and contrast.
  - Kinaesthetic : Muscular, articular and tendinous sensations. Kinaesthetic organs of the internal ear. Ampullar and vestibular senses.
  - Measurement of sensations : Units of measurements. Stimulus limen and differential limen. Weber-Fechner Law.
5. Image : Sensation and image. Image types. Synaesthesia.
6. Attention : Nature and stages of attention. Measurement of degrees of attention. Fluctuation. Distraction. Accommodation. Bodily changes in attention. Interest and attention.
7. Perception : Sensation and perception. Psychological experience of space and time : extensity and duration. Theories : Nativistic and genetic.
8. Visual : Third-dimension. Stereoscopic vision. Optical illusions. Figure and Ground. Hallucination.
  - Auditory and Tactual : Tonal fusion. Localisation—Theory of local sign. Two-point judgments—Aesthesiometric index.
  - Movement perception : Phi-phenomenon. Perception of temporal intervals. Rhythm. Melody.
9. Association and Memory : Conditions of associations. Processes of memorisation. Retention, Recall, Recognition, Reproduction. Forgetting. Memory image. Memory span. Memory training.
10. Imagination : Nature. Development of imagination. Make-belief. Day-dreams and dreams. Invention.
11. Learning : Types and laws of learning. Maze learning by animals and men. Conditioned reflex. Habit formations.

11. **Feeling and Emotion :** Sensation and feeling. Attention and feeling. Experimental study of feeling. Wundt's tri-dimensional theory. Bodily changes in emotions. Emotive expressions. McDougall's view of instinct and emotion. James-Lange theory of emotion.

12. **Action :** Types of action. Reaction-time experiments. Work and fatigue. Volition.

13. **Thought :** Analysis of thinking : thought element. Judgment. Reasoning. Belief. Thought and Language.

14. **Intelligence :** Nature of intelligence. Intelligence Quotient and its measurement. Influence of heredity and environment.

15. **Personality :** Types of personality. Personality traits.

### *Paper II—Child and Educational Psychology*

#### *Child—50 marks*

(1) Problems. Scope. Methods., (2) Physical development from infancy to adolescence. Sensory and motor developments. (3) Genetic foundations of behaviour. (4) Native endowments and their modifications. Maturation. (5) Fantasy and Play. Imitation. Curiosity. Creative activity. (6) Speech development. (7) Mental development : intellectual, emotional, social, moral.

#### *Educational—50 marks*

(1) Aims and methods of education. (2) Innate tendencies and education. (3) Learning curve. Laws of learning. Transfer of training. Mental work and fatigue. (4) Intelligence tests : Nature. Kinds. Norms. Tests of special abilities. (5) Educational tests : Educational quotient. Accomplishment quotient. New type examination : its advantages and disadvantages. (6) Education of the special types : Gifted, Deficient and Problem children.

### *Paper III—Practical*

(1) Accommodation. Far and Near points. Pupillary reflexes. Blind spot. Colour blindness. (2) Field of vision and colour zones. Perimeter. (3) Brightness. Colour contrasts. Colour mixtures. (4) Pressure—Temperature and pain spots. Paradoxical sensations of cold. (5) Tones and Noises. Resonance. Pitch. Intensity. Timbre. Beats. (6) Smell Mixtures. Olfactometer. (7) Taste compensations. (8) Kinaesthetic sensations. (9) After-image, adaptation, localisation of sensations and effects of summation of stimuli. (10) Binocular rivalry, third dimension, two-point threshold. Perception of movement. (11) Illusions. (12) Feeling. Impression and expression. Pneumograph and Ergograph. (13) Attention. Range. Tachistoscope. (14) Image types. (15) Word association. (16) Memorisation. Learning and scoring methods. (17) Reaction time. Vernier. Hipp's Chronoscope (Make-Break).

*N. B.*—Students should be trained in introspection. They are required to keep records of Practical work and to familiarise themselves with the apparatus used.

The Laboratory note-books of candidates shall be inspected and marked by examiners, and if they are found to be unsatisfactory, candidates will be disqualified. Note-books which have not been signed at frequent intervals by the Professor under whom the candidates worked, will not be accepted.

## HONOURS COURSE

### THEORETICAL

#### *Paper I—General Psychology*

In addition to the detailed and critical study of the topics mentioned in the Syllabus for the Pass Course the following should also be studied :—

(i) The stand-points of the Functional, Behaviouristic, Gestalt and Hormic schools of Psychology. (ii) Psycho-physical methods. (iii) Function of autonomic nervous system. (iv) Principles of construction and standardisation of intelligence tests. (v) General ideas of projective methods of assessing personality.

#### *Paper II—Child and Educational Psychology*

In addition to the detailed and critical study of the topics mentioned in the syllabus for the Pass course the following should be studied :—

(i) Development of special abilities and ideas, such as apprehension of time, number, shape, etc., colour preferences, understanding of picture. (ii) Methods of safeguarding and promoting mental health. (iii) Principles of construction and standardisation of achievement tests for school subjects.

#### *Paper III—Social and Abnormal Psychology*

##### *Social Psychology—50 marks.*

(1) Field of social psychology. Methods of study. (2) The primitive man : His society and religion. Forms of marriage. (3) Origin and character of Matriarchy and Patriarchy. Sibs. Clans. (4) Origin and development of language, (5) The individual and the group. The concept of group mind. (6) Psychology of the crowd and the mob. Public opinion. (7) Attitudes. Stereotypes. Propaganda.

##### *Abnormal Psychology—50 marks.*

(1) Conception of abnormality. Different views. Criteria of normality. (2) Mental disorder : General ideas of different kinds of mental disorder. (3) Mental deficiency : Nature and grades. Detection and measurement of mental deficiency. (4) Dissociation. Somnambulism. Hypnotism. (5) Neuroses, Psycho-neuroses and Psychoses : their main symptoms. Delusions and Hallucinations. (6) Dreams : mechanism of dream formations. Day-dreams. Errors in everyday life. (7) Principles of mental adjustment. General ideas of psycho-analysis.

#### *Paper IV—Special paper. Any one of the following :*

##### *(a) Industrial Psychology and Mental Measurement.*

##### *Industrial Psychology—80 marks.*

(1) Aims. Scope. Methods. (2) The worker. individual differences. (3) The environments. illumination, noise, temperature, ventilation, Dust, etc. (4) The work : Maximum, optimum and minimum output. The work curve. Individual and chain work. Fatigue. Rest. (5) Accidents. Causes. Prevention. Accident-prone personnel. (6) Laws of movement study. General principles of time study. (7) Psychology of advertisement. Salesmanship. (8) Vocational guidance and vocational selection.

***Mental measurements—40 marks.***

(1) Elements of statistics: Normal distribution curve. Standard deviation. Frequency polygon. Correlations. The Scatter diagram. The Null hypothesis. Chi-square. (2) Determination of validity and reliability of tests. (3) Aptitudes and their measurements: Aptitude tests. (4) Rating scales: different kinds. (5) Test of personality.

***B History of Psychology—60 marks.***

Broad outlines of History of Psychology—From the beginning of the Experimental period (J. Muller) up to the present time. Students should be specially familiar with the Psychological systems of J. Muller, Fechner, Helmholtz, Wundt, Galton, Binet, James, Titchener, Freud, Watson, Kohler.

***Special Text—40 marks.***

(To be prescribed by the Syndicate from time to time on the recommendations of the Board of Studies concerned).

**PRACTICAL*****Papers V and VI***

In addition to the Pass Course Practical the following :—

(1) Statistical methods: Mean, Median, Mode, Average deviation, standard deviation. Probable error. Correlation. Graphic representations. (2) Psycho-physical methods. Errors. (3) Sensory acuity. Threshold and differential limen. (4) Weber-Fechner's Law. (5) Fluctuation of attention. (6) Learning. Mirror drawing. (7) Mental work and fatigue. (8) Hipp's chronoscope, Choice reactions.

*N. B.*—Students should be trained in introspection. They are to keep records of Practical work and to familiarise themselves with the apparatus used.

The Laboratory note-books of candidates shall be inspected and marked by examiners, and if they are found to be unsatisfactory, candidates will be disqualified. Note-books which have not been signed at frequent intervals by the Professor under whom the candidates worked, will not be accepted.

**CHAPTER XXXVI**

The following revised syllabus in Statistics for the B A. and B.Sc. Examinations were adopted :—

## **B.A. and B.Sc. Examinations**

### **Revised Syllabus in Statistics**

**PASS COURSE*****Theoretical*****PAPER I*****Descriptive Statistics***

Compilation and classification of data, tabulation, graphical and diagrammatical representation including use of Semi-log and double-log graph

**papers.** Interpretation of tables, charts and diagrams. Discrete and continuous variable. Frequency polygon, histogram and ogive. Concepts of statistical population, frequency curves and random samples. Mean, median, mode, quartile, decile, percentile, range, quartile deviation, mean deviation, standard deviation, moments, Sheppard's correction without proof for moments up to fourth order, co-efficient of variation, measures of skewness and kurtosis. Hypergeometric, binomial, Poisson and normal distributions. Approximation of binomial by Poisson and that of binomial and Poisson by normal distribution. Use of the normal probability integral. Non-normal distributions—empirical derivation of the Pearsonian differential equation and statement of the general properties of the simple types of the curves (Types I, II, III and VII), use of  $(\beta_1, \beta_2)$ —diagram in specifying the different Pearsonian curves.

Smoothing of data—free-hand smoothing, method of moving averages, method of least square and method of moments. Graduation by a straight line and a second degree parabola and any curves easily reducible to these forms.

General ideas of association, contingency and correlation. Contingency tables, co-efficients of association and co-efficient of contingency. Correlation table, co-efficient of correlation, regression line, "between array" and "within array" variance, uses of regression line. Bivariate normal distribution statement of its general properties. Linear regression involving three variables, regression plane and corresponding partial and multiple correlations, correlation ratio.

### *Applied Statistics*

Contents of the following Indian official publications :—

Statistical Abstract, Census of India, Monthly Abstract of Statistics, Agricultural Situation, Annual Reports of the Railway Board, Annual statement of the sea-borne trade of India, Statistical abstract of West Bengal.

Construction and use of index numbers, elementary consideration regarding choice of base period, items, formulae and weights, price index formulae (Laspeyres's, Paasche's, Bowdler's, Marshall's, Fisher's Ideal index). Chain index and Cost of living index. Time series—concepts of trend, seasonal and cyclical variations; determination of trend by free-hand smoothing, moving average and fitting of a straight line, a second degree parabola and curves easily reducible to these forms by least squares method, determination of seasonals by moving average method and averaging ratios to trend.

Sample Survey—its importance, advantage of random sample over subjective sample, drawing of random samples from a finite population, description of random, purposive and stratified samples, discussion of the problems of preparation of forms and enquiry schedules.

Statistical quality control—its advantages, control charts for mean, range,  $p$  and  $c$ .

Rates in problems of vital statistics—birth and death rates (crude and specific), gross and net reproduction rates. Elementary ideas about the structure of a life table.

### **PAPER II**

#### *Probability*

Elements of the theory of probability—classical definition of probability, addition and multiplication theorems, repeated trials (hypergeometric, binomial and Poisson distributions) statement of Bernoulli's theorem, mathematical expectation as far as the theorems on the expectation of sum of random variables and product of independent random variables.

### *Interpolation*

Explanation of  $\Delta$  and  $E$  operations, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula (without remainder term).

### *Sampling Theory*

Statistic and its sampling distribution, estimate and its standard error, test of significance, derivation and use of the formulae for standard error of estimates for binomial proportion, difference of two such proportions, mean (without correction for finite size). Use of the formulae for standard error of the estimates for mean (finite and infinite population), variance, standard deviation, co-efficient of variation,  $\beta_1, \beta_2$ , regression and correlation co-efficients, any function of random variables. Application of small sample tests—' $t$ ' test for mean of a single normal population, difference of means of two normal populations, simple correlation and regression co-efficients, partial correlation and regression co-efficients involving three variables;  $F$ -test for ratio of variances of two normal populations and in problems of analysis of variance (one-way and two-way classified data excluding interaction). Uses of Pearsonian  $\chi^2$  test for independence in contingency tables (including Yates' correction for small frequencies in  $2 \times 2$  tables) and for goodness of fit.

### *Design of experiments*

The basic principles of design—randomisation, replication and local control. Preparation of lay-outs of completely randomised arrangement, randomised block design and Latin square. Technique of analysis of variance with reference to the analysis of the above three designs.

### *Practical*

### PAPER III

Problems in practical paper should not require knowledge of theory beyond what is demanded in Theoretical papers.

Scrutiny of data and reconciliation of discrepancies. Tabulation, graphical and diagrammatical representation of data; use of semi-log and double-log papers. Interpretation of tables, charts and diagrams. Drawing of frequency polygon, histogram and ogive and their uses. Free-hand smoothing of data. Calculation of measures of location and dispersion, moments up to fourth order (with Sheppard's correction),  $\beta_1, \beta_2$ , co-efficient of variation, measures of skewness and kurtosis. Use of  $(\beta_1, \beta_2)$ -diagram. Fitting of binomial, Poisson and normal distributions and their uses. Graduation by a straight line and a second degree parabola. Problems of contingency and correlation as included in the Theoretical papers. Index numbers and time series as in the Theoretical papers. Use of the Indian official statistical publications mentioned in the Theoretical papers. Interpolation. Drawing of random samples from a finite population. Application of small sample tests  $t$  and  $F$ . Application of large sample tests for proportions, a single mean and difference of two means. Application of Pearsonian  $\chi^2$ . Designs of experiments as in Theoretical papers.

Questions in the Practical paper will also involve simple problems requiring the above calculations.

### HONOURS COURSE

#### *Theoretical*

#### PAPER I

In addition to the corresponding topics included in the Pass course :

### *Descriptive Statistics*

Definition of cumulants. Inequalities concerning moments (Liapounouff's inequality and other simple inequalities). Simple derivation of Sheppard's corrections. Pearsonian system of curves—derivation of the differential equation and its solution yielding curves of types I to VII, fitting of these curves by the method of moments, representation of these curves in the  $(\beta_1, \beta_2)$ -diagram. Use of incomplete beta and gamma integrals. Discussion of Gram's series type A and its fitting.

Smoothing of data—method of group averages, graduation by a polynomial or any curve reducible by suitable transformation to a polynomial.

Detailed study of the bi-variate normal surface. Non-linear regression—fitting of a polynomial regression, splitting of the total variance into the three components: "due to linear regression," "deviation of array—means from linear regression" and "residual." Linear regression involving more than three variables and the corresponding multiple and partial correlation co-efficients, Intra-class correlation, Rank correlation and Grade correlation

### *Numerical Mathematics*

In addition to the topics under "interpolation" in the Pass course :

$\Delta$  and  $E$  operators. Divided differences. Newton's divided difference formula, Central difference formulae—Gauss' forward and backward, Stirling's, Bessel's and Everett's formulae. Derivation of the remainder term in these formulae. Sub-tabulation. Inverse interpolation. Use of Newton's forward formula for bi-variate interpolation.

Numerical differentiation. Numerical integration—trapezoidal rule, Simpson's one-third and three-eighth rules, Weddle's rule, Newton-Cotes's formula, Central difference quadrature formulae. Euler-Maclaurin expansion, Stirling's approximation for  $n!$  Error terms of Simpson's and Weddle's rules.

Numerical solution of equations in one unknown—Newton-Raphson's method, method of false position, method of iteration, Graffe's root squaring process for obtaining real roots of algebraic equations, Horner's method. Extension of Newton-Raphson's method and method of iteration to the case of two unknowns.

Harmonic analysis with 12-ordinate scheme

### **PAPER II.**

In addition to the corresponding topics included in the pass course :

### *Probability*

Mathematical expectation including moments and moment generating functions. Lexi's ratio. Baye's Theorem. Tchebyscheff's inequality. Weak law of large numbers. Continuous probability—notation of distribution function and probability density function.

### *Sampling Distributions*

Derivation of the following sampling distributions: linear function of normal variables (independent and dependent),  $t$ -distribution,  $\chi^2$ -distribution (and its additive property),  $F$ -distribution, joint distribution of means, variances and correlation co-efficient for samples from bi-variate normal population when  $\rho \neq 0$ , correlation co-efficient ( $\rho = 0$ ), simple regression co-efficient. The uses of the above distributions in corresponding tests of significance concerning mean and variance of a single normal population, difference of two

means and ratio of two variances (both uncorrelated and correlated cases), differences of means of  $k$  independent samples, a single regression co-efficient (simple and partial), difference of two regression co-efficients (simple and partial), correlation co-efficient (simple, partial and multiple), linearity of regression, correlation ratio, combination of probabilities.

### *Estimation*

Criteria for a "good" estimate—consistency, unbiasedness, efficiency (in the large sample sense) and sufficiency. Maximum likelihood estimate and statement of its properties. Derivation of the maximum likelihood estimates of the parameters of the following populations: binomial, Poisson, rectangular, univariate and bivariate normal. Correlation between an efficient estimate and an inefficient estimate. Consistency of the following estimates: proportion, mean, median, standard deviation. Efficiency of median. Sufficiency of the estimates of mean in Poisson distribution, and mean and variance of a normal population. Simple concept of interval estimation.

### *Large Sample Approximation*

Statement of the central limit theorem and its implications. Derivation and use of the standard error of the following estimates: (exact expressions for) multinomial proportion, linear function of correlated variables, mean (finite and infinite population), difference between two binomial proportions; (approximate expressions for) quantile, variance, co-efficient of variation, standard deviation, ratio of two means, any function of correlated variables.

Transformation of variables to make the variance (in large samples) stable, its application to derive  $\text{Sin}^{-1} \sqrt{p}$ ,  $\sqrt{x}$ ,  $\log S$ ,  $z$ -transformation of correlation co-efficient. Use of these transformations in tests of significance.

Derivation and uses of the distribution of Pearsonian  $\chi^2$ .

## **PAPER III**

In addition to the corresponding topics included in the pass course:

### *Testing of Hypothesis*

Definition of simple and composite hypotheses. Tests and critical regions. Two kinds of error. Level of significance and power of a test. Most powerful and unbiased tests for simple hypotheses concerning one parameter derivation of such tests, actual construction of such tests for hypothesis about the mean of a single normal population when the variance is known, and of one-sided uniformly most powerful tests for the variance of a normal population when the mean is known. Sequential test of a simple hypothesis against a simple alternative (derivation of any of the properties not required).

### *Analysis of variance and co-variance*

Heterogeneity and analysis of variance and co-variance. Simple statement of linear hypotheses, orthogonal splitting of the total variation. Two-way classified data with the same number of observations (more than one in each cell) and selection of valid error. Application of analysis of variance for testing regression co-efficient, correlation ratio, linearity of regression, multiple correlation and regression, comparison of different regression co-efficients. Application of analysis of co variance to control of error in one-way and two-way classified data

### *Design of Experiments*

Detailed discussion of the principles of the design of experiments. Shape and size of the plot and block. Split plot design. Factorial experiment—



its advantages, main effect and interaction of two factor and  $2^3$  experiment, confounding (total and partial) with reference to the  $2^3$  experiment. Groups of experiments—randomised block and Latin square designs.

### *Sample Survey*

Types of population. Random sampling from different populations. Description of random, purposive, stratified, multi-stage and multi-phase sampling. Random sampling numbers (Tippet's, Kendall-Smith's, and Fisher-Yates) and their use. Forms and schedules for enquiry.

Discussion of the general principles of sample surveys. Details of two-stage sampling (equal size case and without correction for finite population), stratified sampling with fixed units, and stratified area sampling with units of variable size but constant within a stratum.

## PAPER IV

In addition to the corresponding topics included in the pass course :

### *Official Statistics*

Method of compilation and presentation of important Indian official statistical publications relating to agriculture, census, industrial production, mineral production, trade, railways and price. Critical study of publications relating to agriculture and census only.

(Here mainly the publications of the Central Government are to be considered).

### *Economic Statistics*

Tests in connection with index numbers—time-reversal, factor-reversal and circular tests. Sensitive price index numbers. Fitting of trend by a polynomial and by mathematical curves easily reducible to a polynomial form and by logistic, Gompertz and modified exponential curves. Determination of seasonal index by link relative method. Fixed and changing seasonal patterns. Study of cyclical fluctuation by periodogram analysis. Correlation of two time series. Statistical law of demand and its determination from time series data in terms of link relatives and trend ratio.

### *Vital Statistics*

Standardised death-rate, infant mortality rate, morbidity rate, death ratio, case fatality rate, incidence rate, maternal mortality rate, vital index.

Graduation of mortality rates by Gompertz and Makeham's laws. Logistic curve for population growth.

### *Educational and Psychological Statistics*

Percentile curves and percentile ranks. Combining and comparing examination scores, Norms and scaling procedures.

Determination of mean true score, relationship between true and error variance, and definition of parallel tests.

**Statistical Quality Control**

**Sampling problems. Sampling inspection and use of sampling inspection plans (single, double and sequential sampling plans).**

**Practical****PAPER V**

Practical problems will be of such a nature as not to require knowledge of theory beyond what is demanded in theoretical papers.

Problems on the topics under "Descriptive Statistics" in theoretical paper I (excluding the fitting of Types IV, V and VI of Pearsonian curves, Gram's series type A) more than second degree polynomial and linear regression involving more than 3 variables). Usual tests of significance are to be considered wherever necessary.

Interpolation—use of Stirling's, Bessel's and Everett's formulae. Sub-tabulation.

Harmonic analysis with 12—ordinate scheme.

Problems on the topics of theoretical paper II.

**PAPER VI**

Practical problems will be of such a nature as not to require knowledge of theory beyond what is demanded in theoretical papers.

Construction and analysis of the following designs : completely randomised arrangement, randomised block, Latin square, split-plot. Analysis of two factor unconfounded experiment and confounded  $2^3$  experiment.

Official Statistics.

Economic Statistics—in addition to pass course, determination of seasonal by link relative.

Vital Statistics—adjusted death rates, gross and net reproduction rates, fitting of logistic curve.

Quality Control—construction of control charts for mean, range,  $p$  and  $c$ .

**CHAPTERS XXXV-A & XXXVI-B**

The following revised changes in the Regulations and Syllabuses of Studies for the I.Sc. (Ag.) and B.Sc. (Ag.) Examinations were adopted :—

**Changes in the Regulations and Syllabus for the I.Sc.(Ag.) Examination  
(Chapter XXXV-A)**

(1) Under Regulation 2 in para. 1 change the word 'Matriculation' by 'School Final' and delete para. 2.

(2) Under Regulation 7 at the end of the first sentence in place of the word "Course" write "Part I Class".

(8) Revise Regulation 8 as follows :—

“ The subject and distribution of papers and full marks for the Intermediate Examination (Science) in Agriculture shall be :—

*Group I (Language and basic sciences)*

	Theoretical		Practical	
	Papers	Full marks	Papers	Full marks
(i) Vernacular	...	1 100	...	...
(ii) English	...	1 100	...	...
(iii) Agricultural Mathematics	...	1 100	...	...
(iv) Physics	...	1 100	1	50
(v) Chemistry (Inorganic and Organic).	2	200	2	100
(vi) Botany	...	1 100	1	50
(vii) Zoology	...	1 100	1	50

*Group II*

(i) Crop Husbandry	...	1 100	1	50
(ii) Animal Husbandry	...	1 100	1	50
(iii) Agricultural Economics and Rural Sociology.	1	100	...	...
(iv) Rural Extension	...	...	1 oral	50
Total		1,100	+400=1,500"	

(4) Revised Regulation 9 as follows :—

“Each theoretical and practical paper shall be of three hours. In each practical paper and in Rural Extension 20% marks shall be set apart for laboratory note book and records of work.”

(5) Revise Regulation 10 as follows :—

“In order to pass the Intermediate Examination (Science) in Agriculture a candidate must obtain 80% marks in the theoretical papers and 40% in the practical or oral papers in each subject, and in the aggregate 34% of marks of all the subjects.

In order to be placed in the First Division a candidate must obtain 750 marks and in order to be placed in the Second Division 600 marks. A candidate who passes in all subjects and in the aggregate but obtains less than 600 marks shall be placed in the Third Division.”

The Detailed syllabuses in the different subjects are appended :—

**VERNACULAR**

*Full marks—100*

(a) Translation from English into Vernacular	...	15 marks
(b) An unseen passage to be summarised or amplified in the Vernacular.	15	„
(c) Questions on the subject-matter and on the language of prescribed texts (to be drawn up by the Academic Council on the recommendation of the Board of Under-Graduate Studies in Agriculture.)	40	„
(d) Questions on composition	...	10 „
(e) Essay—heading being given	...	20 „

## ENGLISH

*Full marks—100*

- (a) Translation from Vernacular into English ... 20 marks  
*Or,*  
 A comprehensive test of unseen passage ... 20 „  
 (b) Precis writing or substance writing from unseen passage ... 20 „  
 (c) Summarising or amplifying of passages from prescribed texts 40 „  
*(to be drawn up by the Academic Council on the recommendation of the Board of Under-Graduate Studies in Agriculture.)*  
 (d) Essay—to be confined to specific points given ... 20 „

## AGRICULTURAL MATHEMATICS

## GROUP A

*Full marks—25*

Algebra :—Notions of Surds and Indices; A.P. and G.P.; Variation; Solutions of elementary (i) Simultaneous, (ii) Quadratic and (iii) Exponential equations. Permutation and Combination. Logarithm and its application. Binomial and Exponential Theorems.

## GROUP B

*Full marks—25*

Trigonometry, Co-ordinate Geometry and Graphic Methods :—Measurement of angles. Trigonometrical Ratios; Trigonometrical ratios of some standard angles. Measurement of heights and distances. Elementary Trigonometrical Equations and Inverse Circular Functions.

Use of squared paper, Scales of representation, plotting of points, Linear graphs. Graphical solution of linear equations. Equations of straight lines, circle, parabola and ellipse and their graphical representation.

## GROUP C

*Full marks—25*

Mensuration :—Area of plane surfaces—Triangle, Quadrilateral, Circle and Circular Rings. Field book. Volume and surface of solid bodies like Rectangular Solids, Prism, Pyramid, Right Circular Cylinder, Right Circular Cone, Wedge; Frustum of a Pyramid, Right Circular Cone and Wedge and Sphere. Capacity of tanks and wells.

## GROUP D

*Full marks—25*

Elements of Biometry :—Compilation and Tabulation of data. Ogive, Histogram, Frequency Polygon. Pie Chart. Measures of central Tendency and Dispersion, Coefficient of variation. Simple Linear regressions and Correlation.

*The topics under all the four groups are to be treated in an elementary manner.*

## PHYSICS

## THEORETICAL COURSE

*Full marks—100**Mechanics*

System of fundamental units, measurement of length, mass & time, measurement of area and volume of irregular bodies, mass and weight, velocity and speed, acceleration and retardation, Newton's laws of motion, Force and Impulse, Parallelogram of forces, composition and resolution of forces, Acceleration due to gravity, variation of 'g' (simple pendulum, second pendulum, kinetic & potential energy, conservation of energy, transformation of energy, Levers, Young's modulus, Hooke's law, Definition of tensile strength, ductility, malleability.

*Hydrostatics*

Transmission of pressure in liquids, Pascal's law, Hydraulic press, Archimedes' principle, Specific gravity and density, Determination of Specific gravity of solids, liquids by simple methods, weight of air, pressure of air, Fortin's barometer, Boyle's law, Weather forecasting, Lift, Compression and exhaust pumps.

*Heat*

Heat and temperature, thermometers, simple experiments to show expansion of solids, liquids & gases, Unit of heat, Thermal capacity, Specific heat, Latent heat, water equivalent, Laws of saturated and unsaturated vapours, Dew point, Relative humidity & Hygrometers, Melting & boiling points, Simple experiments to illustrate processes of conduction, convection and radiation of heat, Determination of J, Heat engine, Petrol engine.

*Light*

Laws of reflection & refraction of light and experiments to verify them, Lenses, Refractive indices, Deduction of  $1/v - 1/u = 1/f$ , Determination of focal length, Projection of Pure spectrum, Terrestrial telescope, compound microscope.

*Sound*

Definitions of wavelength, frequency & velocity of sound, sound propagation, Laboratory method of finding out the velocity of sound, characteristics of musical note. Simple harmonic motion.

*Magnetism*

Preparation of artificial magnets, mapping of magnetic field, magnetic moments, difference between magnetic & non-magnetic substances, magnetic elements, magnetic induction.

*Electricity*

Production and nature of frictional electricity, lines of force, potential, Gold-leaf electroscope, Electrostatic induction, electrophorus. Simple Voltaic cells with their defects and remedies, ammeter, voltmeter, tangent galvanometer, Barlow's wheel, Ohm's Law, resistances in series and parallel, heating and chemical effects of current, laws of electromagnetic induction and experiments to verify them. Working principles of motor, dynamo.

## PRACTICAL COURSE

*Full marks—50*

Length measurement of millimetre rule. Verniers—Linear and angular Callipers. Measurement of areas by plotting on squared paper Measurement

of angles by protractors. Determination of specific gravities of solids and liquids. Reading of Barometric height. Determination of specific heat. Latent heat of fusion of ice. Demonstration of simple optical instruments. Magnetisation of needles and determination of their poles. Charting of lines of force due to a magnet in different positions. Construction of a simple cell and use of the simple galvanometer.

## CHEMISTRY

### *Paper I*

(Inorganic Chemistry)

#### THEORETICAL COURSE

*Full marks—100*

Measurement of mass & areas, Chemical Balance.

Atoms, molecules and electrons, symbols, equations, formulae; chemical calculations.

General laws for gases. Avogadro's hypothesis. Determination of density of gases and vapours. Determination of atomic, molecular and combining weights. Ordinary physical processes: Diffusion, osmosis, sublimation, distillation, crystallisation.

Periodic law with special reference to some properties of element, Atomic number.

Hydrogen: preparation, properties & uses.

Oxygen: preparation, properties & uses.

Acids, bases and salts. Oxidation and Reduction. Electronegative and electropositive elements.

Electrolytes, electrolysis, Faraday's laws, ions, electrochemical equivalent.

Water; hardness, softening and purification of water.

Hydrogen peroxide: preparation, properties and uses.

Nitrogen, Ammonia. Oxides of nitrogen, nitric acid and nitrates.

Atmospheric nitrogen and its fixation. The nitrogen cycle.

Carbon. Carbon dioxide and carbonate, carbon monoxide. Combustion flame, safety lamp

Chlorine, bromine and iodine, Hydrochloric, hydrobromic and hydroiodic acids and their salts.

Sulphur, sulphur dioxide and sulphur trioxide. Sulphuric acid Sulphuretted hydrogen.

Phosphorus. Phosphorus pentoxide. Phosphoric acid and its salts. Silica and the silicates. Borax.

The following metals and their important compounds—sodium, potassium, calcium, magnesium, aluminium, iron, lead, copper, silver, mercury, zinc.

#### PRACTICAL COURSE

*Full marks—50*

Preparation of crystals and determination of water of crystallisation

Separation of chemical and mechanical ingredients of a mixture, e.g., sand and salt.

Preparation and properties of hydrogen, oxygen chlorine and ammonia.

Detection of chloride, sulphate, sulphide nitrate, carbonate and phosphate of calcium, potassium, sodium, aluminium, magnesium, copper, lead, zinc, ammonium, mercury.

Acidimetry and alkalimetry.

Determination of equivalent weight of zinc.

*Paper II**(Organic Chemistry)*

## THEORETICAL COURSE

*Full marks—100*

Carbon compounds: aliphatic and aromatic, general properties and behaviour. Closed and open chains; saturated and unsaturated compounds.

Hydrocarbons—methane, ethane, ethylene and acetylene. Halogenation of hydrocarbons. Chloroform iodoform

Methyl and ethyl alcohols. Glycerine.

Ethylether.

Formaldehyde, acetaldehyde, acetone.

Acids—formic, acetic and fatty acids. Fats and oils, soaps. Oxalic, lactic, tartaric and citric acids.

Carbohydrates—dextrose, fructose, lactose, sucrose, starch, cellulose.

Acetamide. Urea, aminoacids, proteins.

## PRACTICAL COURSE

*Full marks—50*

Preparation and properties of methane, ethane, ethylene and acetylene.

Detection of the following organic compounds given as single substances—methyl alcohol, ethyl alcohol, formic acid, acetic acid, oxalic acid, citric acid, lactic acid, tartaric acid, glucose, sucrose, starch, fat protein.

Extraction of oils and fats.

Determination of glucose and sucrose.

## BOTANY

## THEORETICAL COURSE

*Full marks—100*

Phenomenon of life. The plant cell, protoplasm, nucleus, cell-contents, cell divisions (mitosis, meiosis) and the formation of tissues. Difference between plant and animal, lowest form of plant and animal life. General-classification of plant kingdom—Thallophyta—Bryophyta—Pteridophyta—Spermatophyta—(1) Gymnosperms, (2) Angiosperms—Monocotyledons and Dicotyledons.

The external morphology and the main anatomical features of Monocotyledons and Dicotyledons. Roots, stems and leaves; their anatomy in relation to the functions performed by these organs, primary and secondary growth and difference between herbaceous and arborecent plants. The structure and development of the flower and the functions of its various parts. Inflorescence, pollination, fertilization and development of the embryo, seed and fruit. Various kinds of seeds and fruits and their dispersal. The structure and germination of seeds.

The food of plants and its absorption and transport; transpiration, nutrition, photosynthesis, storage of food materials, respiration.

Conditions of growth, growing regions in plants, response to external stimuli.

Elementary facts of ecology and evolution.

Study of the general characteristics of the different groups of plants with special reference to agricultural crops of West Bengal; Malvaceae, Rutaceae, Cucurbitaceae, Cruciferae, Leguminosae, Solanaceae, Compositae, Rosaceae, Euphorbiaceae, Gramineae, Liliaceae, Scitamineae.

## PRACTICAL COURSE

*Full marks—50*

Dissection and examination of selected types of materials for demonstration of subject matter mentioned in the syllabus.

Simple experiments on germination, absorption, transport, transpiration, photosynthesis, respiration.

Study of natural orders in the laboratory as well as in the field as indicated in the theoretical course.

## ZOOLOGY

## THEORETICAL COURSE

*Full marks—100*

The distinctive properties of the living and the non-living.

Distinction between plants and animals

A general survey of the animal kingdom with special reference to agriculture—beneficial and injurious.

Elements of classification and general characters of invertebrata and vertebrata.

General account of the animal cell and the four fundamental types of tissues.

A broad classification of the insects with special reference to crop pest relating to rice, pulses, sugarcane.

Study of the general morphology of the following types :—

Invertebrata—Amoeba, paramoecium, hydra, earth worm and cock-roach.

Vertebrata—Fish, frog, fowl and goat (peculiarity of the stomach).

## PRACTICAL COURSE

*Full marks—50*

Identification, demonstration and dissection of the external and internal morphology of the types mentioned in the theoretical course.

## CROP HUSBANDRY

## THEORETICAL COURSE

*Full marks—100*

Soils—formation, soils of West Bengal with special reference to crops. Soil management, tillage, drainage, liming, soil and soil moisture, conservation, weed control, mulching. Soil fertility and its maintenance : manures and manuring : organic manures—farm-yard manure, green manure, compost ; inorganic fertilizers—nitrogenous, potassic and phosphatic.

Elements of agricultural meteorology.

Implements—indigenous and improved ploughs, harrows, hoes and hand-tools. Their construction, adjustment and working.

Cultivation of crops : Cereals—paddy, maize, jowar and wheat, Pulses—arhar, gram, mug, musur, Oil seeds—sesamum, rape and mustard, linseed, ground nut and niger. Jute, sugarcane and cotton Fodder crops. Vegetables—root, leafy and fruit—summer monsoon and winter varieties. Fruits—banana, papaya, pineapples, and general care of mango, citrus, guava and litchi.



**Practical Course****Full marks—100**

Identification of soil types.

Tillages—working with preparatory and post preparatory implements and hand-tools.

Irrigation—acquaintance with common water-lifts, and methods of irrigation.

Identification of seeds, crops, manures and fertilizers.

Sowing, planting, preparation of layouts, after-care and harvesting of important crops :—paddy, jowar, arhar, mug, sugarcane, jute, cotton, vegetables, banana, papaya, pineapple. Simple methods of vegetative propagation :—cutting, layering, inching, cleft grafting and shield budding.

**ANIMAL HUSBANDRY****THEORETICAL COURSE****Full marks—100****Animal Management :—**

Economic importance of live-stock.

Points of Cattle and Poultry.

Cattle and Buffaloes : Type—draught, milch and dual purpose.

Characteristics of important breeds of Cattle, Sheep, Goat, Poultry and Ducks in India.

General methods of breeding, feed and management of Cattle, Buffaloes, Sheep, Goat, Poultry and Ducks.

Maintenance of breeding, feeding and production records.

Concentrates : Pulses, cereals oil-cakes by-products of grains.

Fodder : Straw, hay, green fodder and silage.

Hay and Silage making. Cultivated grasses and fodder crops.

Pasture : Temporary and permanent pastures. Improvement, manuring and management of pastures—rotational grazing.

**Veterinary Hygiene :—**

Air, Impurities, Ventilation—methods of ventilating animal houses.

Water : Sources, impurities, methods of purification. Water requirements of animals and methods of watering animals.

Housing : Wall, floor and roof. Essential housing requirements for different classes of live-stock.

Sanitation : Drains. Disposal of Sewage. Disposal of solid and liquid excreta. Manure pit.

**Veterinary Hygiene :—**

Infection—methods of infections. Common disinfectants. Spraying and dipping. Foot baths. Signs of health and diseases. Common contagious diseases—Foot and Mouth, Rinderpest, Haemorrhagic Septisemia, Anthrax, Ranikhet, Fowl cholera, Mastitis, Black quarter, abortion, their symptoms, preventive and control measures, common digestive disturbances and parasitic diseases and their remedies. Immunisation and fish aids.

Fisheries : Common fresh water fishes—rohu, katla, mrigel and jiol. Identification of their fries and rearing.

**PRACTICAL COURSE****Full marks—50**

Points of the Cattle and Poultry. Identification of breeds of Cattle, Sheep, Goat, Fowls, Ducks, common fishes and bees.

Preparation of rations and feeding farm animals. Sanitation of farm buildings

Dressing of wounds. Castration, tatooing, dehervring, branding and shoeing.

## AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

*Full Marks—100*

(A)

The physical and economic Geography of West Bengal. Utilization of natural resources. Goods produced from lands, mines, forests, rivers and seas, conservation of resources. Prevention of wastes.

Scientific discoveries and technical inventions as agents in the creation of value. Rivers and sources of irrigation and power. Changes in Agriculture.

Agricultural wealth. Food crops. Commercial crops. Statistics of acreage, yield, value, improved varieties, etc., as well as of holdings, their size and ownership.

The cultivator. The labour, the trader, bazars, fairs, exhibitions.

Rent, wages, profit.

Theory of value and price.

The economic unit in farming. Kinds of farming. Management. Capital. Moneylenders. Banks : Co-operative Credit ; State-aid.

*Agricultural Marketing* :—Assembling, storing, grading, standardisation, financing, advertisement.

(B)

The gainfully employed in agriculture. Cottage industries. Other rural occupations.

Races, castes, classes, migrations.

The cultivator's family. Food. Nutrition. Standard of Living, Income per head.

Rural houses, roads, diseases, doctors, public health.

Underemployed. Handicapped. Widows Orphans. Children. Feeble-minded.

Educational and recreational institutions. Agricultural experimental stations. Demonstration farms. Radio.

Land Tenure. Rural Indebtedness. Law and the cultivator. Litigation.

Government activities in agriculture, animal husbandry, fishing, forestry, etc.

Union Boards, Panchayats, District Boards, Departments of Agriculture, Land Revenue, Health and Education.

## RURAL EXTENSION

*Full marks—50*

### THEORETICAL COURSE : CLASS WORK

Rural Extension—its meaning, need and scope.

Agricultural Extension services and Rural Youth movements in North West Europe, United Kingdom, U.S.A., Australia and New Zealand.

Rural reconstruction in India. Sarbodaya Philosophy. Community Development Projects, National Extension Service and the Five Year Plan.

Village patterns and characteristics of Rural life in India.

**Leadership :—**

(a) Patterns of formal and informal leadership in rural areas.

(b) Qualities of a leader.

(c) How to train rural people to be leaders (leadership training). Principles of learning and teaching

*N.B.—To deal with the above topics at least 20 classes should be devoted.*

#### PRACTICAL COURSE : VILLAGE WORK

Brief study of the Agricultural practice in villages. Study of rural housing, sanitation, educational and health facilities, problems of fuel; irrigation facilities; storage of grain.

*Method Demonstrations on :—*Compost making, scientific methods of preparation of farmyard manure and urine conservation; general village sanitation; lay out of kitchen gardens; first-aid; treatment to cattle and humans; presowing treatment of seed. Construction of suitable village latrines.

Students will have to carry out some community work which will emphasise the dignity of labour, for example—construction of village approach roads, construction of village recreation grounds, cleaning of village wells, digging of soak pits.

*N.B.— Students will have to devote at least 4 weeks of actual village work in periods of not less than one week at a time under immediate supervision of a teacher.*

### Changes in the Regulations and Syllabus for the B.Sc. Agriculture Examination (Chapter XXXVI. B)

(1) Under Section 1 delete "Preliminary, Part I and Part II".

(2) Replace Section 2-A and 2-B by the following Section under Section 2-A :—

"Any under-graduate who has passed the Intermediate Examination (Science) in Agriculture or an examination considered by the Syndicate as equivalent thereto, may be admitted to the Bachelor of Agriculture Part I Examination, provided he has prosecuted a regular course of study for not less than one academical year in one or more colleges affiliated to the University.

Provided further, that any under-graduate who has passed the Intermediate Examination in Science and has thereafter also passed a qualifying examination on the agricultural and allied subjects of the Intermediate Examination (Science) in Agriculture, as given under Section 6-A, having prosecuted a regular course of study for not less than one academical year in one or more colleges affiliated to the University for the purpose may also be admitted to the Bachelor of Science in Agriculture Part I Examination under the same conditions as stated in paragraph above.

(3) Change numbering of Section 2-C to '2-B'

(4) Under Section 3 in the first sentence, in place of "the Bachelor of Science in Agriculture..... Part I" write "any" and after the word "Examination" insert "under these Regulation".

(5) Under Section 4, in para, 1, in place of "Preliminary" write "Qualifying Examination".

(6) Under Section 5, in place of "The Bachelor of Science..... Part II" write "All the aforesaid" and in place of "the examination is held" write "these examinations are held".

(7) Revise Section 6 in two parts, viz., 6-A and 6-B, as follows :—

"6 A. The qualifying examination as mentioned in Section 2-A above will consist of an examination of the underlisted subjects of the Intermediate Examination (Science) in Agriculture, the minimum pass marks in each subject 80% and in aggregate 84% of all the subjects comprising this examination.

*Subjects*

- (1) Agricultural Mathematics
- (2) Chemistry : Organic
- (3) Botany
- (4) Zoology
- (5) Crop Husbandry
- (6) Animal Husbandry
- (7) Agricultural Economics & Rural Sociology
- (8) Rural Extension

A list of the candidates who have passed this examination will be published in alphabetical order, without any division, along with the results of the Intermediate Examination (Science) in Agriculture.

"6-B. The subjects prescribed for the Bachelor of Science in Agriculture Part I and Part II Examinations and distribution of papers are as follows :—

**BACHELOR OF SCIENCE IN AGRICULTURE, Part I**

(Subjects and distribution of papers as at present).

**BACHELOR OF SCIENCE IN AGRICULTURE, Part II**

(Subject and distribution of papers as at present except that the Practical paper in Agricultural Statistics, Farm Accounts and Farm Management is omitted).

(8) Change Section 7 as follows :—

"7. Each Theoretical paper for the Bachelor of Science in Agriculture Part I and Part II Examinations shall be of 8 hours and carry 100 marks, each Practical paper of these examinations shall be of 6 hours and carry 100 marks. In each Practical paper 25% marks shall be set apart for oral examination and another 15% marks for laboratory note books and records of work."

(9) Under Section 8 in place of "any of the aforesaid" write "the Bachelor of Science in Agriculture Part I and Part II".

(10) Under Section 9 delete "Preliminary and" and in place of "examinations" write "examination".

(11) Under Section 12, add the following to the last sentence :—

"Provided that in the case of an agricultural graduate joining a post-graduate course of studies in an agricultural subject which also includes field work, in an institution recognised by the University, six months' regular attendance to the said course will be taken as equivalent to the Practical Training required for agricultural graduates."

(12) Under Section 13, in place of "Preliminary Bachelor of Science in Agriculture examination" write "Qualifying examination as provided under Sections 2 A and 6-A above." Also delete "to which it is equivalent" occurring at the end of the paragraph.

(13) Under Section 14, correct limits of the subjects (Agronomy, Agricultural Statistics, Farm Accounts & Farm Management, Agricultural Zoology, Animal Husbandry & Agricultural Chemistry) of the B.Sc. (Ag.) Part I and B.Sc. (Ag.) Part II Examinations as follows :—

**AGRONOMY**

**B.Sc. Ag. Part I**

*Theoretical Course*

*Fertility of land*—Its meaning and factors affecting it.

*Tillage*—Objects, kinds of tillage and tillage requirements of different crops.

*Manures and manuring*—Substances essential for plant growth, factors of deficiency. Types of manures, principles underlying manuring of crops

**Fertilizer mixtures, manuring of different crops—green manure, farmyard manure, compost, oil cake, fertilizers.**

**Irrigation—Sources, factors controlling irrigation, methods with special reference to layout of crops in West Bengal, interval of irrigation, dose of irrigation, water requirements of crops.**

**Drainage—Methods. Saline and Alkali soils—their causes, reclamation.**

**Seeds and Sowing—Selection of seeds and sets, principles underlying methods of sowing, planting, transplanting, spacing; depth of sowing and planting.**

**Weeds and Weeding—Classification, losses caused, uses of weeds, methods of weed control.**

**Dryfarming—Its scope, relation to rainfall, dry farming crops and tillage methods suited for them.**

*Practical Course*

(Same as in existing syllabus)

**AGRICULTURAL STATISTICS, FARM ACCOUNTS & FARM  
MANAGEMENT**

**B.Sc. (Ag.) Part II**

*Theoretical Course*

The course should be treated in two halves. The first paragraph of existing syllabus comprising *A. Half* and the rest comprising *B. Half*. Further it is recommended that the following be added to the last sentence in para. 3 of *B. Half*:—"with varying cropping schedule."

*Practical Course*

To be omitted.

**B.Sc. (Ag.) Part II**

**AGRONOMY**

*Theoretical Course*

**Detailed study of crops of West Bengal with reference to (i) importance of each crop; (ii) distribution in world and in India in general and in West Bengal in particular; (iii) classification and varieties; (iv) general soil and climatic requirements, (v) preparation of seed-bed, time of planting, method of planting, rate of planting; importance of pure seed, after-tillage, manuring, and rotations; (vi) harvesting, storing, preparation for market, (vii) yield quality, cost and profit; (viii) agronomic improvements in the production of crops.**

**Climatic divisions of the world in general and India and West Bengal in particular. Climatic requirements of important crops of West Bengal like paddy, jute, oilseeds, pulses, potato, sugarcane, tobacco, wheat, fodders.**

**Crop rotation:—Rotation, fallows and mixtures, principle underlying these; importance of leguminous crop in rotation.**

*Practical Course*

**Practical acquaintance with methods of cultivation of important *kharif* and *rabi* crops of West Bengal, and their processing.**

**Silage making, composting, green manuring.**

**Recognition of good seed and good plants for seed production.**

Agronomic observations and records on crops—simple field experiments, collection of data and studies thereof.

B.Sc. (Ag.) Part I

## ANIMAL HUSBANDRY

### *Theoretical Course*

**Nutrition and dietetics** :—The composition of the animal body and its nutritional requirements. Composition of foods and feeding stuffs. Common foods and fodders and their usefulness. Energy metabolism energy value starch equivalent. Total digestible nutrients, nutritive ratios, mineral requirements, Principles of feeding of farm animals.

Feeding standards and the computation of rations. Food preparations and the methods of feeding—cattle, buffaloes, horses, sheep, goat and poultry, Calf rearing.

**Dairying and rest** :—As per existing syllabus with inclusion of "Physical and chemical properties of milk" after composition in para under "Milk."

### *Practical Course*

A. Identification of common foods and fodders. Physical examination of foods and fodders for quality judging. Preparation and computation of rations.

B. As per existing syllabus Add: "Keeping quality of milk" after standardisation of milk; and replace the word "Homogenization" by "Homogenization." Also, add "and (20) Dahi making" after "Ice-cream making" at the end of the paragraph.

B.Sc. (Ag.) Part I

## AGRICULTURAL ZOOLOGY

### ENTOMOLOGY

### *Theoretical Course*

In the last line after "Sericulture," add "Apiculture."

B.Sc. (Ag.) Part II

## ANIMAL HUSBANDRY

### *Theoretical Course*

**Genetics** :—Heredity—importance of heredity. Variation—due to environment, hybridization, recombination and mutation. Laws governing inheritance. Expression and interaction of factors—dominant, recessive and lethal factors. Complimentary, allelomorphic and modifying factors. The cell—structure cell, germ and somatic cell, production of new cells, mitosis and meiosis, chromosomes, genes. Linkage and crossing over. Chromosome theory of inheritance. Sex determination, sex differentiation and sex reversal. Inheritance of abnormalities, heredity and disease, disease resistance.

**Animal Breeding** :—Reproduction. Mechanisms of reproduction; the male reproductive organs, the female reproductive organs, spermatozoon and ovum. Physiology of reproduction. Growth, fertility—factors affecting fertility, pregnancy and parturitions, hormonal influences, Oestrus cycle and period, signs of oestrus, Signs of pregnancy, pregnancy diagnosis time of parturition, act of parturition, care and management of pregnant animals. Care prior to parturition, at parturition and after parturition. Dystokia and its reduction.

**Artificial insemination**—advantages and disadvantages, collection of semen, evaluation of semen, dilution of semen, transport and preservation of semen, methods of insemination. Selection : phenotypic and genotypic herd-book and selection, selection of dairy cows, breeding bulls, progeny testing, pedigree, sire index.

**Systems of breeding**—Inbreeding, outbreeding and grading up. Judging of Livestock—system of judging. Analysis of individual score card. Management of cattle, buffaloes, sheep, goat and poultry. Types of farming, arable, dairy and mixed farms, preparation of schemes for farms, stocking, capital with particular reference to Dairy and Livestock farms, Estimate of income and expenditure, Study of farm records and elements of book keeping.

#### *Practical Course*

Evaluation of semen. Judging of Livestock. Study of breeding records. Attendance at cases of parturition. Taking pulse, temperature and respiration. Determination of age of animals. Evaluation of the characters of the animals. Study of inherited characters. Study and use of appliances used for artificial insemination.

#### **B.Sc. (Ag.) Part II**

### **AGRICULTURAL CHEMISTRY**

#### *Theoretical Course*

(1) Under "II Bio-Chemistry" after "Enzymes"—add "Preparation, classification and identification."

(2) Change part entitled "II Dairy Chemistry" in the existing syllabus by the following :—

#### *Dairy and Food Bacteriology :—*

Sources of contamination of milk. Kind and Growth of Bacteria in milk. Principles involved in the preservation of food products. Utilization of agricultural waste products.

#### *Practical*

Change subject-matter under "B" by the following :—  
"Preparation and examination of common enzymes."

The above changes will take effect from the examination of 1959.

### **CHAPTER XXXVII-A**

The following Syllabus for Petroleum Technology (Special Subject for M.Sc. Tech. Part II Examination in Applied Chemistry was adopted :

#### **THEORETICAL**

#### *Paper I, 1st Half General consideration about Petroleum Industry*

Distribution, Statistics, Theories of origin, Geology of Petroleum & Natural gas. Petrology. Nature of oil accumulation, mode of formation and preservation, Oil shows and their significance, basic principles of the search for oil, Geological and Geographical distribution of oil fields. Drilling methods, Handling, transport & storage of crude oil and natural gas. Chemistry of Petroleum, Composition, Physical properties of Petroleum, Routine tests of crude and refined petroleum products.

*Paper I, 2nd half Theoretical considerations regarding the utilisation of Petroleum Products as fuels, lubricants etc.*

Industrial calculations as applied to Petroleum Industry. Heat and material balances in a refinery plant, PV-T relations. Theory of combustion—knocking. Antiknocking fuel oil burning, Comparison of Petroleum as fuel to other conventional fuels and nuclear fuels Theory of lubrication.

*Paper II, 1st half Petroleum refinery Engineering*

Organisation and history of refinery development, Refinery out line. Laboratory data for design, Revision of the general course on unit operations with special reference to petroleum technology e. g., Exchangers, coolers, condensers, Tube still heaters, auxiliary equipment, Corrosion of equipments, Fluid flow, Heat transfer, Distillation, extraction as applied to Petroleum Industry, etc.

*Paper II, 2nd Half Technology of Production of various Petroleum products*

Cracking, thermal & catalytic Rebuilding of Hydrocarbons polymerisation, alkylation, Isomerisation, fuel oil, Production of gasoline, Kerosene, Lubricating oil & greases and other petroleum products, Solvent treatment & extraction processes, Dewaxing, Petroleum Industry bye products, Petrochemicals, Synthetic Petrol Industry.

*Tentative syllabus for Practical work*

- (1) Routine laboratory tests for petroleum products (Petroleum products and lubricants, a report by Committee D-2 of A.S.T.M.).
- (2) Evaluation of oil stocks.
- (3) Distillation characteristics of petroleum stocks and refining products.

*Text book and references*

- (1) Petroleum refinery engineering—W. L. Nelson (McGraw-Hill, 1941.)
- (2) Chemical Technology of Petroleum—Gruse and Stevens (McGraw-Hill, 1942).
- (3) American Petroleum Refining—Bell (Van Nostrand, 1945).
- (4) Chemical Constituent of Petroleum—A. N. Sachquate (Reinhold, 1945).
- (5) Physical Constants of hydrocarbon—Egloff (Reinhold, 1939 47).
- (6) Science of Petroleum—(Ed. Dunstan, et al.) (Oxford University Press)

**CHAPTER XXXVII-A**

The revised syllabuses in Radiophysics and Electronics for the M.Sc. (Tech.) Examinations were adopted :—

**PART I**

**Theoretical**

**PAPER I**

*Group I—Electrical Machines and Measurements*

D. C. Machines—The armature. The armature winding. Equaliser rings. Commutation. Armature reaction. Use of Inter-poles. Compensating windings. E. M. F. equations. Characteristics of series wound,



shunt wound and compound wound generators. Efficiency. Back E. M. F. Speed control of D. C. motors. Armature reaction and commutation in D. C. motors. Characteristics of series, shunt and compound motors. Operation of D. C. generators in series and in parallel. Different methods of testing of D. C. machines. Accumulator charging equipment.

**Transformers**—Construction of different types of transformers. Calculation of transformation ratio. Losses in transformers. Efficiency of transformers. Equivalent circuit of a transformer. Regulation; Kapp regulation diagram. Parallel operation of transformers. Testing of transformers; single phase and three phase. Scotts method of transformation. Three phase transformation.

**A. C. Machines**—The alternator. Stator windings; single phase and polyphase. Alternator output waveform. Armature reaction. Synchronous impedance. E. M. F. equation. Voltage regulation. Parallel operation of alternators.

**Synchronous Motor**—Torque. Constant power operation. Hunting.

**Induction Motor**—Construction: single phase and polyphase. Rotor E. M. F., slip and frequency. Starting and running torques. Methods of starting squirrel cage motors. Speed control. Equivalent circuit and circle diagram. Output and efficiency.

**Converting Machines**. Rotary converter. Voltage and current ratio. Losses. Armature reaction. Double star and diametral operation. Starting of rotary converters. Voltage regulation. Inverters. Motor converters.

**Phase Advancing**—Advantage of phase advancers. Different types of phase advancers. Economical limit of power factor correction.

**Units, Dimensions and Standards**—C. G. S. electrostatic and electromagnetic units. Practical and legal units. M. K. S. units. Standards of resistance, inductance, capacitance and electromotive force.

**Measuring Instruments**—Moving iron instruments. Hot wire instruments. Electrodynanic instruments. Induction type instruments. Rectifier type instruments. Watt meters: single and polyphase. Integrating instruments. Instrument transformers.

**Measurement of Resistance**—Low, medium and high resistance. Meggers and ohm meters.

**Measurement of Inductance and Capacitance**—Elementary and direct methods. A. C. Bridge methods.

**Potentiometric Measurements**—General principles. D. C. Potentiometers. Thermo-electric potentiometers. Measurement of voltage, current, resistance and power.

**Magnetic Measurements**—Fluxmeter. B-H curves and permeability measurements. Bar and Yoke methods. Permeaters. Magnetic potentiometer.

**Measurement of Frequencies**—Frequency meters. Stroboscopy. Tachometers.

**Localisation of Cable Faults**—Blavier and volt-drop test. Loop-Test. Fault localising bridges. Induction method of testing.

## *Group II—Radio Frequency Measurements and Electroacoustics*

**A. F. and R. F. Measuring Instruments**—Thermocouple and rectifier type instruments. Power output meter. Bridges, A. F. and R. F.; Maxwell's, Hay's, Wein's and Schering Bridges. Q-meter. Vacuum tube voltmeter. Cathode ray oscillograph. Audio oscillator. Signal generators; A. M. and F. M. Distortion factor meter. Wave analyzer. Attenuators.

**Measurement and Capacitance**—Static, low and high frequency capacitance of a condenser. Very large and very small capacitances. Distributed capacitance of a coil. Effective capacitance of a space condenser. Calibration of variable air condenser. Inter-electrode capacitances of a valve.

**Measurement of Inductance**—Low and high frequency inductance. Very large and very small inductances. Mutual inductance and coefficient of coupling.

**Measurement of Resistance**—Low and high frequency resistance. Very high resistance. Resistance of a coil. Effective resistance of a condenser. Negative resistance.

**Measurements on Tuned Circuits**—Sharpness of resonance. Resistance and Q. Dynamic impedance of parallel tuned circuits.

**Measurement of Frequency**—Wavemeter and heterodyne frequency meter. Lecher wires.

**Measurements on Receivers and Amplifiers**—A. M. receiver: sensitivity, selectivity, fidelity and noise figure. Percentage modulation. A. F. and R. F. amplifier: Frequency response and linearity. Regulation and hum of power supply systems.

**Dielectric Measurements**—Dielectrics and their properties. Dielectric loss and power factor of condensers. Measurement of dielectric loss and power factor.

**Theory of vibrations**—Simple systems having one degree of freedom. Multiple systems. Propagation of sound in infinite extended Media and in tubes and horns. Radiation, diffraction and scattering of sound. Dynamical analogies.

**Electro-acoustical instruments**—Microphones. Loudspeakers. Pick-ups. Theory and design of various types. Calibration and testing.

**Recording and reproduction of sound**—Essentials of film, disc, magnetic wire and tape recording. Recording equipment. Reproduction of sound.

**Architectural acoustics**—Reverberation. Measurement of reverberation. Absorption of sound. Measurement of absorption.

**Ultrasonics**—Various methods for the production of ultrasonic waves. High power ultrasonic generators. Applications of ultrasonic waves.

## PAPER II

### *Group I—Engineering Mathematics*

**Algebra**—Determinants. Matrix, linear and quadratic forms.

**Vector Analysis**—Vector algebra. Vector calculus. Theorem of Stokes and Gauss. Application of vector analysis to engineering problems. Elementary principles of tensors.

**Theory of Function**—Sequence. Infinite series: Power series, evaluation of definite integral by the method of power series. Partial derivatives. Total differential. Maxima and minima. Theory of analytic function. Schwarz-Christoffel transformation. Cauchy's integral theorem. Series expansions and singular points. Calculus of residue: Contour integration. Integration of special forms. Reduction formulae. Elliptic integral and functions. Fourier series and Fourier integral. Practical Fourier analysis. Application to circuit theory. Laplace transformation.

**Linear and Partial Differential Equations**—Solutions of differential equations in series. Legendre's Bessel and Wave equations and solution of differential equations by operational method. Approximate methods of solution of differential equation.

**Dynamics**—Laws of motion. Equation of motion. Conservation of energy and momentum. Lagrange's equation. Hamilton's equation and principle.

**Statistics**—Theory of Probability: Standard deviation. Gaussian and Poisson distribution. Probable errors. Correlation coefficient.

*Group II—Electron Tubes and Electron Ballistics*

**General considerations**—Atomic structure. Electron gas in a metal. Classical theory. Work function. Contact difference of potential. Different types of electron emission.

**Thermionic emission**: theoretical considerations—Richardson's theory. Dushman's equation. Thermodynamical derivation of the thermionic equation. Space charge and distribution of potential near the emitter. Effect of a positively charged plate near the emitter. Emission current in relation to plate voltage plane and cylindrical electrode. Effect of initial velocity of emission. Deviation from Child's law observed in practical diodes. Practical determination of the thermionic constants.

**Secondary emission**—Essential facts regarding secondary emission.

**Photo-electric emission**—Threshold frequency. Color sensitivity. Selective photo-electric emission. Effect of light intensity.

**Cold Cathode emission**—Electron emission in intense electric fields. Essential facts regarding cold cathode emission.

**Practical types of thermionic emitters**—Filament of pure metals. Filament of contaminated metals. Thoriated tungsten filament. Activation of thoriated tungsten filament. Carbonisation. Oxide coated filament. Preparation of oxide coated cathode. Characteristics of oxide coated cathodes. General consideration of practical emitters. Emission efficiency. Voltage and temperature drop along the filament. Unipotential cathodes.

**High Vacuum Thermionic Tubes**—Vacuum tube classifications—diode, triode, tetrode, pentode. Structure of typical glass and metal tubes. The high vacuum diode—static and dynamic characteristics. The triode and its characteristics—the equivalent diode—electrostatic field and distribution of space charge—amplification factor and its determination—triode parameters—inter-electrode capacitances—equivalent circuit of triodes. Tetrodes and their characteristics. Pentodes and their characteristics. Remote cut-off, super control and beam power tubes. Multigrid tubes—penta-grid convertors, triode-hexode tubes, duplex tubes, dual grid tubes, acorn tubes and other tubes.

**Gas-filled Thermionic Tubes**—Effect of gas in diodes and triodes. Hot cathode gas-filled rectifier. Mercury pool rectifiers. The thyatron. Cold-cathode diodes and triodes. Gaseous discharges as sources of light. Discharge lamps and fluorescent lamps.

**Photo sensitive tubes and cells**—Current wave length and current-voltage characteristics of vacuum photo-tube. Gas photo-tube constructional features and characteristics. Photo-conductive and photo-voltaic cells.

**Special types of tubes**—Cathode-ray tube—constructional details. Characteristics of electric and magnetic focussing. Electrical and magnetic deflection sensitivity—forms of deflecting coils and plates. Iconoscope. Secondary emission multiplier tube. The electrometer tube.

**Noise in Vacuum Tubes**—Random noise in electron tubes—Flicker noise—theory of noise—equivalent input noise resistance—noise in gas tube, noise figure and its measurement.

**Elements of Vacuum Tube Construction**—Assembly of electrodes. Annealing. Production and maintenance of vacuum—degassing, baking, eddy current heating, gettering.

**Motion of Electrons in electric and magnetic field—Motion of an electron in an electric field—relativistic correction. Motion of an electron in a magnetic field. Motion of electron in combined electric and magnetic field.**

**Electron Optics—Analogy between refraction of an electron and a light beam. Simple electron optical lens. Thick electron lens. Calculation of image distance. P. Q. diagram. Aberration.**

**The Electron Microscope.**

### PAPER III

#### *Group I—A. C. Circuits and Networks*

**Elementary alternating current theory—Sinusoidal current and voltage. Steady state response of series circuit. Vector diagram. Direction of current and voltage when expressed in complex relations. Power and power factor considerations. Steady state response of a parallel circuit. Active and reactive power. Graphic and analytic solutions by vector diagram. Steady state response as a function of frequency. Inductive and elastive voltages as a function of L, S and R. Steady state response of the series circuit in the vicinity of resonance. Sharpness of resonance : half power points. Inductive and elastive voltages in the vicinity of resonance. Parallel circuit in the vicinity of resonance. Instantaneous current—voltage loci.**

**Properties and design of coils, condensers and resistances—Design of coils and condensers—use of ferro-magnetic cores. Q of coils and condensers. Various types of coils and condensers.**

**Coupled Circuits—Differential equations of the two loop network. Steady state solution. Two-loop network with complicated branches. Input impedance. Current and voltage ratios. Magnetically coupled circuits. Coefficient of coupling. Coupled impedance. Resonance in inductively coupled circuits. Resonance by adjustment of primary reactance. Primary resonance by adjustment of secondary reactance. Resonance by adjustment of primary and secondary reactances to zero value. Resonance by adjustment of capacitances in primary and secondary. Resonance by adjustment of mutual inductance. Coupling for maximum power transfer. Ziehen effect.**

**Circle diagrams for simple circuits—Load diagram for parallel circuit—load diagram for series circuit. Predetermination of performance of circuit for loads of different power factors.**

**Polyphase system—Single-phase system. Generation of polyphase voltages. Phase order and symmetry. Balanced three-phase circuit—star connection. Balance three phase circuit-delta connection. Balance three-phase circuits with passive load. Power three-phase circuit. Three-phase power factor and reacting power. Advantages of three-phase systems. Other polyphase systems.**

**Steady state solution for general network—Network definitions. The determinantal method of solution. Generalised network impedance. Driving point and transfer impedance functions. Voltages of same frequency simultaneously impressed. Voltages of different frequencies simultaneously impressed. Bridge circuits.**

**Network theorems—T and  $\pi$  networks. Equivalence of T and  $\pi$  networks. Equivalent T section of a transformer circuit. Fundamental network theorems—Reciprocity theorem—Compensation theorem—Thevenin's theorem—Maximum power transfer theorem—Superposition theorem. Generalised Lattice and other networks.**

Characteristics of two-terminal networks—Foster's reactance theorem—analytical interpretation. Least number of elements. Cauer's extension of Foster's theorem. Equivalence and reciprocity. Barlett's bisection theorem. Extension of the reactance theorem to dissipative cases. Inverse networks.

Characteristics of four-terminal network—Possible relationship between voltages and currents. Derivation of fundamental relation. Symmetrical network. The use of Matrix Algebra in the study of four-terminal network behaviour. Ideal transformers and transformers without loss. Discussion of several basic structures. Characteristic impedance and propagation function. Transmission and attenuation properties of networks. Propagation and characteristic impedance functions of several common structures.

Non-dissipative uniform Ladder structure—The mid-series terminated structure. Physical interpretation. The behaviour in transmission range. The behaviour in attenuation range. Adjustment for best terminal condition.

Conventional filter theory—Basic design considerations. The constant K-type filter. Design procedure for constant K-type filter. Use of half sections. Several common classes (low pass, high pass, band pass, band elimination) of constant K-type filters. Short-comings of constant K-type filters. The m-derived type. Composite filters. Repeated derivations. Reflection effects in composite filters. Fractional termination. Impedance correction.

Attenuator and attenuating pads—Attenuator type T. Attenuating pads type T. Attenuator type  $\pi$ . Attenuating pad type  $\pi$ .

### *Group II—Line Communication Engineering*

The engineering formulation of the long line problem—Distinction between distributed and lumped constant system. Concept of guided wave. Discussion of line parameters. Types of transmission line: single—, two—, four-wire overhead lines. Cables.

Steady state solution to long line problem—Wave character of solution. Characteristic impedance. Wavelength and phase velocity. Hyperbolic forms; Symmetrical forms. Effect of neglecting dissipation. Standing waves. Polar plots. Odd and even quarter-wave lines. Effect of attenuation. General circuit parameters. Input impedance. Voltage, current and power ratio.

Propagation and characteristic impedance function of long line—Ideal behaviour. Attenuation and phase function. Amplitude and phase distortion. Characteristic impedance function.

Artificial and lump-loaded line—Lumped section equivalent of long line. Lump-loaded lines. Cut-off frequency of lump-loaded line. Discussion on loading coil.

D. C. Telegraph System—Telegraph codes. Telegraph keys, relays and sounders. Simplex and duplex working. High speed telegraph systems and teleprinters.

Voice frequency telephone system—Telephone apparatus: transmitter, receiver, relays, plugs, switches, indicator. Ringing arrangements. Manual telephone systems: magneto, central battery, signalling and central battery systems. Junction and trunk working.

Automatic telephony—Principles of step by step system. Autodials. Relays of different types. Rotary line switches, group selectors and final selector: subscriber's set. Small area working and trunking arrangement. Large area working multi-office arrangements. Director system.

Traffic unit and grade of service. Grading. Computation of switches and selectors. Planning local telephone area.

Long distance D. C. Telegraphy and V. F. Telephone—Attenuation and distortion of signals on long lines. Loading of cables. Telegraph and V. F. telephone repeaters. Echo suppressors and singing suppressors. Voice operated anti-singing device for radio telephony. Privacy systems.

Carrier current Telegraphy and Telephony—Choice of carrier frequencies. Width of channels and their separation. Four-wire and two-wire balanced and group frequency systems. Multichannel wide band carrier system. Carrier telephony on power lines. Voice frequency and carrier telegraphy. Simultaneous telephony and telegraphy—simplex and composite systems.

## PAPER IV

### *Group I—Electromagnetic Theory, Antennas and Transmission Lines*

Electromagnetic Waves—Fundamentals of electrostatics and magnetostatics. Maxwell's equations. Energy of the electromagnetic field—Poynting's vector. Wave equations—plane and spherical wave solution. Reflection of a plane wave from a perfect conductor. Reflection and refraction from metallic and lossy dielectric objects. Electric waves in an imperfectly conducting medium.

Physical Principles of Radiation—Radiation current distribution in antennas. Calculation of radiation field in simple cases. Directive radiation. Radiation intensity and radiated power. Radiation intensity of a current element. Radiation patterns. Isotropic radiation. Reciprocity of radiation patterns.

Wave Propagation—Propagation of the ground wave—surface waves and space waves. The sky wave. The ionosphere. Propagation through an ionized medium—Eccles-Larmor theory. Critical frequency. Maximum usable frequency. Variations of ionospheric ionization. Skip distance. Multihop transmission. Fading.

Currents in Antennas—Antenna current. Effect of current distribution on input impedance. Factors affecting current distribution. Quasistatic and dynamic component of electric intensity. Thin current element. Characteristic impedance of a wire. Current distribution in dipole antennas. End effect.

Impedance of Small Antennas—Small antennas; calculation of antenna inductance and capacitance.

Resonant Antennas—Self resonant antennas. Half-wave antennas. Folded dipole. Full wave antennas. End fed antenna. Adcock antenna.

Antenna arrays—Broadside and End-fire.

Transmission Lines—General discussion of transmission lines. Characteristic and input impedance. Transmission lines with uniformly distributed constants. Open, short-circuited and loaded lines. Quarter wavelength lines and their use as impedance matching devices. Resonant and non-resonant lines. Different types of transmission lines. Circle diagram. Breakdown voltage. Maximum power loading capacity. Transmission line elements as impedance transformers, quarter-wave transformers and stubs.

Impedance Matching—Matching of aeriels. Matching by lumped elements. Matching by transmission lines. Balance to unbalance transformer.

*Group II—U. H. F.—Microwave Technique and Radar*

**Generation of U. H. F. and Microwaves—Triodes as U. H. F. Oscillator :** Limitation of conventional tubes at U. H. F. Transit time effects. Limitation due to constructional features. Transmission lines as circuit elements. Negative grid oscillators. Positive grid oscillator; Special tubes: Acorn, Door-knob, Disc-seal type, etc.

**Klystrons:** Velocity modulation; effect of gap. Two cavity and single cavity Klystrons. Electron bunching. Klystron as amplifiers, detectors and multipliers. Amplitude, pulse, frequency and phase modulation of Klystrons. Tuning of Klystron. Hahn-Metcalf tube. Haefl U. H. F. tube.

**Magnetrons:** Negative resistance magnetron, transit time magnetron, travelling wave type magnetron. Principle of operation. Noise in magnetron. Strapping in magnetron. Magnetron feeder coupling. Rieke diagram. Tuning of magnetron. Stabilisation of frequency. C. W. and pulse working of magnetron. Modulation system in magnetron.

**Transmission Circuits—Transmission Lines:** Transmission line elements as sleeves, dielectric loads and slugs. Wide band matching. Co-axial line structure: Right angle corners, co-axial line junction. Non-uniformities in transmission lines. Balance-unbalance transformers.

**Wave Guides:** Transmission line at U. H. F. and Microwaves. T. E. M. propagation characteristics in transmission lines. Attenuation, Q-factor. Transmission of electro-magnetic waves with longitudinal components. Propagation of waves in rectangular and round pipes. Higher modes in co-axial lines. Impedance concept in wave guides.

**Microwave Resonators—Characteristics of rectangular and cylindrical resonators. Resonant frequency  $Q$ ; shunt impedance. Re-entrant type of resonators.**

**Microwave Aerials—Effective area and gain of aerial. Aerial with reflector system. Pyramidal horns, sectoral horns, conical horns, bi-conical horns.**

**Radar—Introduction. The radar equation. Properties of radar targets. Pulse radar. C.W. radar. Receiving system. TR and anti-TR units.**

**U.H.F. and Microwave Propagation—Propagation characteristics—Fading. Tropospheric reflection. Range of a communication system.**

**PAPER V***Group I—Radio Engineering*

**Fundamentals of Vacuum Tube Operation—Characteristic curves and coefficients of triodes, tetrodes and pentodes. Characteristics with load—the load line. Mathematical representation of triode characteristics. Symbols for vacuum tube circuits. Classification of vacuum tube operation—Class A, B and C. Linear operation. Equivalent circuit for linear operation.**

**Single Stage Class A Voltage Amplifier—Voltage amplification of a linear triode amplifier. Input admittance. Tetrode and pentode voltage amplifier. Non-linear operation of vacuum tube amplifiers. Distortion due to non-linearity. Classification of amplifiers based on frequency range.**

**Voltage Amplifiers in Cascade—Distortion in amplifiers. Representation of amplifier performance: Frequency response and linearity. Resistance capacity coupled amplifier. Transformer coupled amplifier. Impedance coupled amplifier. Linearity. Compensation methods. Tuned R. F. amplifiers with various types of coupling. Band pass amplifiers. Video**

amplifiers. Direct coupled amplifiers. Universal amplification curves. Practical considerations in the design of a R-C coupled audio amplifier.

Power amplifiers—Efficiency of amplifiers. Class A amplifiers—maximum undistorted power output. Determination of power output, distortion and efficiency by graphical methods. Class B a.f. amplifiers. Pushpull amplifiers. Class B and Class C radio frequency amplifiers. Simplified analysis of Class C amplifier.

Feedback in amplifiers—Reaction. Difficulties in h.f. amplifiers. Screening and neutralisation. Difficulties in multistage amplifiers. Decoupling. Feedback amplifiers and their design.

Oscillators—Generation of continuous oscillations in a circuit. Valve oscillators. Output and efficiency. Relaxation oscillators. Dynatron oscillator. Crystal controlled oscillators. Franklin oscillator. Audio frequency oscillators.

Modulation (amplitude)—Wireless telegraphy and telephony. Various types of modulation. Amplitude modulation and side bands. Various methods of modulation. Plate modulated oscillator and amplifier. Grid modulated amplifier. Single side band telephony. Carrier suppression methods.

Demodulation (amplitude)—Detection of amplitude modulated waves. Linear and square law detectors. Analysis of square law detection. Analysis of linear detection. Low level and high level detection. Plate and grid detection. Power grid and leaky grid detection. Infinite impedance detector. Diode detector. Heterodyne detector. Superheterodyne detection. Practical superheterodyne circuits. Regenerative detector. Principles of Superregenerative detection.

Frequency Modulation—Phase and frequency modulation. Sidebands in frequency modulation. Reactance valve modulator. Anode bend phase discriminators.

Power Supply for Low Power Electronic Equipments—Power supply requirements for operating vacuum tubes. Electronic rectifiers. Dry contact rectifiers. Vibrators. Elements of a low power rectifier unit. Power supply for A.C.-D.C. equipments.

Receivers—T.R.F. Receivers. Design of the ganged R.F. stages. Superheterodyne receivers; study of different stages. Adjacent channel interference. Image response. Cross-modulation. A.V.C. Receiver characteristics. Measurement of receiver characteristics.

Transmitters—Essentials of a radio telephone transmitter. Master oscillator; crystal control, Franklin drive and special types of stabilised oscillators. Buffer stage. Frequency multipliers. Power amplifier stages. Neutralization: Rice, Hazeltine and other systems. Low level and high level modulation. Carrier and double side band operation. Power supply system for transmitters. Matching of transmitter output to various types of feeders. Typical transmitter antenna and earth system.

Direction Finding—General consideration in direction finding. Loop antennas. Errors in their bearing and its elimination. Night effect. Determination of sense. Goniometer arrangements. Bellini-Tosi system. Adcock system. Polarization errors.

Television—Fundamentals of picture transmission. Scanning. Mechanical Scanners. Iconoscope. Television transmitter and receiver.

### *Group II—Engineering Electronics and Special Circuits*

Single Phase rectifiers—Elementary rectifier theory. High vacuum and gas-filled type rectifiers. Half wave rectifier with smoothing condenser and smoothing inductance. Full wave rectifier with condenser input and choke input filters. Swinging chokes. Thyatron rectifiers.



**Polyphase rectifiers**—Elementary theory. Primary currents in rectifier transformers. Standard rectifier circuits. Back firing. Voltage control. Losses and efficiency. Mercury arc rectifiers. Special circuits for mercury arc rectifiers.

**Industrial control circuits**—Electronic relay circuits. Time delay relays. Capacity-operated relays. Photo-tube controlled relays. Illumination control. Voltage regulation.

**High frequency diathermy**—Human body as a high frequency circuits. Medium wave diathermy. Short wave diathermy. A few typical diathermy apparatus.

**High frequency industrial heating**—Arc and spark oscillators. Valve oscillator. Induction heating. Dielectric heating.

**Trigger circuits**—Theory of trigger circuits. Differentiating and integrating circuits. Eccles-Jordan trigger circuit; Multivibrators. Generation of rectangular pulses; cathode coupled multivibrators, Phantatron, Senatron, etc. Trigger pulse generator. D.C. Restorers.

**Time Base and Cathode Ray Tube Circuits**—Different types of time bases; Linear, Circular and Spiral time bases. Soft and hard valve time bases. Transformer coupled time base. Inductive time bases. Miller integrator. Linearity of time bases. Time base amplifiers. Cathode ray tube circuits. Deflection system; electrostatic and electromagnetic system. Focussing and brilliance control. Timemarkers.

**Voltage Stabilisers**—Flux regulating transformer. Electronic voltage and current stabilisers.

**Delay Networks**—Transmission line as delay line. Artificial delay line. Mercury delay line. Design of delay line. Vacuum tube circuit as delay network.

**Servo Mechanism**—Introduction. The weighting function. Frequency response function. Transfer function. Feedback system. Nyquist criterion. Servo-elements. Synchros. Rotatable transformers. Error measuring systems. Network for operating on D. C. and on A. C. errors. Servo loops.

## PRACTICAL

### PAPER I

#### *Group I—Engineering Drawing (50 marks)*

Use of drawing instruments. Construction and use of scales. Methods of drawing polygon, parabola, ellipse, helix, spiral, involute of a circle. Cams.

Geometrical drawing of solids. Plane sections of solids and true shape. Different types of threads, rivets and rivetted joints, bolts and nuts.

Scale drawings from models: Pipe fittings, wall bracket, plumber block, spur gear, belt pulley and force pump.

Orthographic and isometric drawings of a model.

Scale drawings of electrical apparatus: Insulators, cable connectors, pole shoe with field coil, rotor.

Section of vacuum tubes.

Schedule drawing of an aerial mast from given data.

Tracing and preparation of blue prints.

#### *Group II—Workshop Practice (50 marks)*

Shearing machine, folding machine, circle cutter, etc.—Construction of a chassis, panel brackets and panel out of given metal sheet. Cutting holes on the chassis for valve holders and fitting the panel on the chassis using machine screws and nuts.

Drilling machine, power, saw, etc.—Construction of a rectangular metal plate of given dimensions. Drilling holes on it so as to fit in the legs of a given template.

Files, divider, etc.—Making a hexagonal nut of specified dimensions out of a metal rod. Cutting a cam of given contour.

Lathe, files, etc.—Making a pin of given dimensions out of given metal Rod. Preparing an extension shaft.

## PAPER II

### *Group I—Electrical Machines (50 marks)*

Three Phase Alternator—Determination of the no load saturation curve. Short circuit test. Predetermination of percentage regulation by synchronous impedance method. Study of the variation of field current with load at constant terminal voltage (field characteristic) and hence calculation of percentage regulation.

D.C. Motor—Speed control at no load : Field current control ; Armature rheostatic control. Calculation of efficiency from losses.

Self-excited D.C. Generator—No load test : Variation of no load voltage with field current at const. R.P.M. ; Variation of no load voltage with R.P.M. at constant  $I_f$ . Study of the variation of field current with load at constant terminal voltage (field characteristic). Determination of voltage characteristic for constant field current ; for constant resistance in field circuit.

Single Phase Transformer—Open circuit test. Short circuit test. Predetermination of percentage regulation and efficiency for various loads and power factors.

Three Phase Rotary Converter—No load test and voltage conversion ratio.

Three Phase Transformer—Study of voltage transformation ratio for different connections of primary and secondary.

Three Phase Induction Motor—No load test. Blocked rotor test. Construction of circle diagram and computation of motor performance data.

### *Group II—Line Communication (50 marks)*

D.C. Transmission—Measurement of characteristic impedance. Theoretical verification of the same. Finding the equivalent Thevenin's Generator. Verification of the maximum power transfer theorem. Transmission loss of the given 4-terminal network for different terminations.

A. F. Transformers—Study of the frequency response characteristic with two different polarities. Measurement of self inductance and leakage inductance. Calculation of the effective self capacitance.

Filters—Low-pass, High-pass, Band-pass—Study of the variation of the characteristic impedance by volt-ampere method. Plots of open-circuit and short-circuit impedances. Measurement of the attenuation and phase characteristic with proper termination. Study of the effects of mismatch.

Artificial Transmission Lines—Calculation of the real and imaginary parts of the characteristic impedance. Study of the variation of attenuation with frequency. Effect of loading.

Amplifiers—Study of the R-C coupled and transformer coupled audio-amplifiers with the variation of circuit parameters.

Negative Feedback Amplifiers—Measurement of the complex gain with different values of feedback. Study of the complex gain with different values of feedback. Calculation of the maximum value of feedback for no oscillation and the approximate frequency of oscillation when the amplifier is just made to oscillate.

Relays—Study of various aspects of relay performance.

## PAPER III

*Radio Electronics (100 marks)*

Thermionic emission and diode characteristics—Verification of Child's Law.

Characteristics of a triode—Determination of the tube constants and their variation with plate current. Determination of dynamic characteristics of a triode with a resistive load by direct measurement and from study of d.c. load line. Study of the characteristics with the load at the cathode end.

Simple magnetron tubes—measurement of  $e/m$ .

Triode constants by voltage variation method—Determination of gain of a triode amplifier by measurements with a volt-meter and verification of the same by drawing the a.c. load line and the equivalent plate circuit. Study of the gain in relation to load. Measurement of distortion.

Characteristics of a vacuum tube in relation to its geometry.

Measurements on cathode ray tubes. Study of firing characteristics of a thyratron—methods of controlling the plate current.

Power supply systems for low power electronic equipments. Voltage regulator tube and electronic voltage regulating equipment.

Conversion conductance of pentode, pentagrid mixer, octode and triode-hexode by the indirect method.

Vacuum tube voltmeters—measurement of a.c. voltage utilising the principles of diode detection, leaky grid detection and anode bend detection.

Studies on a simple L-C (tuned grid) oscillator.

Characteristics of vacuum and gas-filled photo-tubes. Studies on photo-electric relay equipment.

## PAPER IV

*Radio Engineering (100 marks)*

Variation of  $Q$  of a coil with frequency and with different core materials. Measurement of  $Q$  and self-capacitance of a coil with a  $Q$ -meter. Measurement of power factor and effective inductance of a paper dielectric capacitor at radio frequency.

Study of coupled circuits.

Power Amplifiers—Class A, single-ended and push-pull and Class B push-pull.

Effect of various parameters on the performance of an L-C oscillator.

Experimental study of the performance of a Class C R.F. amplifier.

Experimental study of a modulated R.F. amplifier—grid and plate modulation.

Input impedance at radio frequency of a tuned anode (i) triode amplifier and (ii) pentode amplifier (verification of Miller Effect).

Experimental study of detectors: diode, leaky grid and anode bend types.

Characteristics of Communication Receivers.

Loudspeaker performance—measurement of frequency response characteristics.

Polar diagram of microphones.

## PAPER V

*U.H.F.—Micro-wave Technique and Special Circuits (100 marks)*

Study of the power output and frequency of a reflex Klystron for various values of beam voltage and reflector voltage.

Study of radiation characteristics of micro-wave horns : Open aperture; obstacles in the aperture.

Measurements with standing wave bridge—Calibration of the bridge. Variation of impedance with frequency of different type of resistors, chokes and capacitors.

Loop aerial—study of the polar diagram and the effect of neighbouring conductors on the polar diagram. Measurement of field strength of weak and strong signals.

Constants of an antenna—length less than quarter-wavelength ; length nearly equal to quarter-wavelength.

Study of multi-vibrators : bi-stable, mono-stable and astable.

Time bases using hard valve. Measurement of linearity. Triggered time base.

Time bases using thyatron valve—measurement of frequency, linearity and flyback time. Synchronization and triggering.

## PART II

### THEORETICAL

#### PAPER I

##### *Group I—Industrial Administration*

The Historical Background of Industrial Development.

Fundamental considerations in Industry—Basic management decisions. Plant location.

Organisation Development and Types of Organisations—Co-ordination and morale.

Product Development and Research—Simplification and standardisation of product and materials. Processes and materials. Inspection.

Material and Production Control—Routing, scheduling and despatching. Production control in diversified manufacturing and mass-production industries.

The Factory Building and Plant Layout—Material handling. The Maintenance Department.

Motion and Time Study—Establishing Time values by Time Study. Utilizing Time Study data.

The Basis of Industrial Wages—Wage plans. Special forms of wage payment.

The Sales and Purchase Departments—Budget. Managerial control and office administration. Classification and identification.

Industrial Relations. Personnel Management.

##### *Group II—Industrial Economics*

World resources and their utilization.

Industrial Evolution—The Historical Process. Rise of the Factory System. Social Effects of the Industrial Revolutions.

Fundamentals of Economics—Production. Capital. Land. Labour. Specialisation. Monopoly-Markets and Exchange. The Stock Exchange. Value and Price. Distributions. Mechanization. Rationalization. Demand and Supply.

**The Trade Cycle—Past Cycles. The Course of Cycles. Effect on Distribution of Incomes. The Causes of Depression.**

**National Income—National income in real terms. Index numbers. Internal and external influences affecting income-getting power. Inequality of income and social class. Distribution of income amongst people.**

**Fixed Charges—Interest. Nominal and Effective Interest Rates. Investment. Depreciation and Amortisation. Taxes and Insurance. Operating Costs. Capitalised Cost.**

**Money, Banking and Exchange—The Money Market. Interest Rates. Control of the Monetary System. Foreign Exchange. The Gold Standard. The International Monetary Fund.**

**Labour Laws. Factory Legislation.**

## PAPERS II AND III : ELECTIVE SUBJECTS

### 1. *Radio Engineering*

#### PAPER II

**Transmitters—Methods and Systems of obtaining modulation. Modulation systems for telegraph transmitters. Output coupling circuits. Parallel operation of transmitters. Monitoring and measuring equipment. Sources of power. Safety devices and interlock circuits. Secrecy systems.**

**Radio Broadcasting Practice—Elements of a broadcasting system. Studio Technique. Control room apparatus. Studio-transmitter link. Study of a complete high power transmitting station.**

**Studio Acoustics—Principles of room acoustics. Requisites for ideal acoustics of studios. Optimal reverberation time. Noise. Reduction of airborne and solid borne noises. Radio broadcast and sound recording studios.**

**Antennas—Interaction between antennas : Self and mutual impedance of antennas. Radiation from coupled antennas. Rhombic antennas. General theory of linear antenna. Different types of Antenna Array systems.**

**Receivers (Broadcast and Communication)—Different types of receiving aeriels. Aerial circuit. Signal to noise ratio and its influence in receiver design. Band spreading. I.F. amplifier. Crystal filters. Selectivity Control. Double superheterodyning. A.F.C. Muting. Noise suppression circuits. Audio frequency stages. Tone control. Tuning indicator. Automatic tuning. Remote control tuning. Superregenerative receivers. Conditions of reception at different hours of the day and night and at different frequencies—polarisation, fading, diversity reception. Allocation of frequency to various types of stations.**

**Problems in Radio Communication—Propagation characteristics of radio waves of different frequencies : Very low frequency waves, low frequency waves, medium frequency waves, high frequency waves. Propagation characteristics of U.H.F. and micro-waves. Application of propagation data to communication problems.**

**Television—Image analysis and bandwidth consideration. Waveform Generators. Cameras. Composite signal. Various types of modulators. Television transmitters. Receivers. Separation of picture and synchronizing signals. Clamping circuits. Magnetic and Electrostatic C.R. tubes. E.H.T. Supply. Projection.**

**Facsimile Transmission—General considerations. Scanning. Modulation methods. Reception. Recorders. Synchronisation. Transmission.**

**Frequency and Phase Modulation—Various types of angular modulation and their characteristics. Armstrong's modulator. Other types of frequency modulators. Frequency modulated transmitters. Limiters. Discriminators.**

**High Power Transmitting Tubes**—Special considerations relating to high power tubes. Constructional features: Radiation cooled, air cooled and water cooled tubes. Methods of testing.

### *Radio Engineering*

#### PAPER III

**Radio Frequency Measurements**—Primary and Secondary Frequency standards. Measurements on A.M. and F.M. receivers.

**Miscellaneous Measurements**—Polarisation of downcoming waves. Direction finding: Miscellaneous direction finding systems, C.R. direction finders, spaced loop direction finders. Static and noise.

**Pulse Methods of Measurements**—Characteristics of A.F. amplifiers and video amplifiers. Transmission line irregularities and characteristic impedance. Velocity of transmission along lines.

**Radar Receivers**—Detectors: Diodes and silica crystal. Micro-wave mixers and local oscillators. Balanced mixers. Local oscillator noise. A.F.C. system. I.F. input circuits and amplifiers.

**Radar Beacons**—Function of beacons. Types of beacon systems. Range requirements. Frequency and other considerations. Noise.

**Radio Aids to Navigation**—General consideration. The long wave radio range: Decca, Gee, and Loran. U.H.F. Radio Range. Homing: Instrument landing system. Altimeter.

**Network Theory**—Network synthesis: Brune's and Darlington's methods. Synthesis of single loaded loss-less coupling network. Cauer's method. Synthesis of loss-less two-terminal pair network. Filter design method based on lattice structure: Impedance and index function of various filter classes. Frequency transformation. Cauer's and Bode's methods of parameter determination. Ladder development and other lattice equivalent—Simulative and corrective network: Amplitude and phase distortion corrective networks. Compensating and simulating networks.

**Micro-wave Technique**—Antennas: Radiation from a horn. Slot aerial. Aperture illumination and antennic pattern. Feeds of micro-wave antennas. Metal lens antennas. Dielectric housing of antennas. Transmission Circuits: Various co-axial line structure: Co-axial line junction. Non-uniformities in transmission lines. Balanced-to-unbalanced transformers. Wave Guides: Impedance concept in wave guides. Wave guide junction. Magic tee. Directional couplers. Discontinuities in wave guides. Transition units. Micro-wave filters. TR and anti-TR units. Wave guide terminations.

**Micro-wave Measurements**—U.H.F. and Micro-wave signal generators: Noise source. Micro-wave attenuators: Cut-off attenuator. Mode filtering. Resistive attenuators. Micro-wave power measurement: Thermistor, bolometer and barretter. High power measurement. Measurement of frequency and wave length: Co-axial and cavity wavemeters. Measurement on cavity coupling systems. Primary frequency standards. Frequency spectrum and pulse shape measurement. S.W.R. bridge measurements. Dielectric measurements.

#### 2. *Advanced Electronics*

#### PAPER II

**Electron Ballistics**—Motion in electric and magnetic fields. Approximate methods of solution.

**Electron Optics**—Solution of ray equations: analytic and graphical methods. Measurement of electron lens characteristics. Aberrations in electron lenses.

**Theory of Metallic Electrons**—Fermi-Dirac statistics. Net and gross work function and their variations.

**Electron Emission from Metal**—Emission from pure metals. Thermionic constants. Emission from composite types of cathodes. Mechanism of photo, field and secondary emission.

**Thermionic Tubes**—Space charge flow of current. Theory of diodes. Electrostatic field in miniature tubes. Mutual characteristics. Microphonics. High power transmitting tubes. Special tubes. Electron inertia and electronics of u.h.f. tubes. Scaling.

**Noise**—Random noise and distribution laws. Campbell's theorem. Valve and circuit noise. Noise figure—its measurement.

**Figure of Merit**—Gain-bandwidth and stability of valve amplifiers. Grounded grid and grounded cathode operation.

**Design of Rectifier and Detector Diodes**—Receiving tube design. Transmitting tube design.

**Cathode Ray Tubes**—Electron guns and their design. High efficiency guns. Design of focussing and deflecting systems. Post deflection tubes. Power supply system. Double beam tubes. Persistent vision tubes. Performance of a cathode ray oscilloscope. Performance at u.h.f. Photograph of beam traces.

**Velocity Modulation**—Principle of velocity modulation. Second order theory. Klystron amplifier. High power Klystrons. Efficiency and noise.

**Travelling Wave Tubes**—General description. Theory of interaction of electron beam and field in a circuit. Gain and efficiency. Noise. Space charge wave tubes. Resistive wall tube.

**Magnetron**—Design of magnetron: resonant system; cathode and magnetic circuit. Tuning of magnetron; mechanical and electronic. Analysis of magnetron: space charge; transient behaviour; noise. Indigital magnetron—Mode A, B and C; effect of finger shape.

**Mass Spectrograph**—-ray spectrometer, Particle accelerators.

**Discharge Phenomena**—Townsend discharge. Criteria of voltage breakdown. Different modes of discharge. Basic phenomena in gaseous discharges. Discharge tube as a circuit element. Noise.

**Cold Cathode Gas Tubes**—Hot cathode gas tubes. Mercury pool tubes.

**Miscellaneous Tubes**—Storage and camera tubes. Secondary emission tube. Strobotron. Phasitron. Counters. Multipliers. Selectron. Tacitron.

**Physics of Solid States**—Formation of crystal lattice. Electronic bands. Lattice irregularities. Electronic band structure of conductors, non-conductors and semi-conductors. Free and bound electrons. Concept of hole. Fowler and Wilson's theory of semi-conductors. Basic physical phenomena in crystals.

**Contact p.d and Work Function**—Volta p.d Measurement of contact p.d.

**Photoactive Devices**—Photo-voltaic cells. Photo conducting devices. Barrier layer devices. Photo transistors.

**Phosphors**—Mechanism of phosphorescence. Properties of typical phosphors.

**Crystal Rectifier**—Mechanism of crystal rectification. Point contact and junction rectifiers.

**Transistors**—Principles of transistor action. Point contact and junction transistors. Essential characteristics. Transistor as circuit element. Various modes of operation of transistor amplifiers. Transistor amplifier performance. Cascading. Transient response. Negative resistances characteristics of transistors. Special applications. Measurement on transistors. Analogue transistors. Transistor tetrodes. Fieldistors.

### PAPER III

**Pulse Techniques**—Transient response of linear networks : Determination of network response by Fourier Transforms ; Transient response of networks using Laplace Transforms. Pulse generators : Multivibrators ; Blocking oscillator ; Relaxation oscillator ; Line type pulser. Generation of high power pulses : Hard tube pulser ; Line type pulser ; Pulse transformers. Pulse Shaping and Clamping Circuits : Limiters, Clippers ; Differentiators ; Delay-line shaper ; Integrators ; D.C. restorer ; Clamp. Pulse Modulation systems : Pulse modulation—amplitude, time, width and slope ; Pulse code modulation. Measurement of Pulses : Pulse amplitude, width and rise time ; Spectrum analysis. Specialised circuits : Sealing circuits ; Electronic counters ; Amplitude discriminators ; Pulse length discriminators. Millimicrosecond Pulse Technique : Discharge-line type pulse generator ; Pulse generator employing secondary emission valves.

**Amplifiers**—D.C. amplifiers. Pulse amplifiers. Magnetic amplifiers.

**Relays**—Relays for remote control. Telephone type relays. Photo-electric relays. Gas-filled relays. Earth-leakage and over-load relays. Thermal relays. Electron-tube switches.

**Servo-mechanism**—Introduction : Types of servo-mechanism. The weighting function. Frequency response function. Systems with feedback. Nyquist criterion. Multiloop servo-systems. Servo-elements : Error-measuring systems ; Synchros ; Rotatable transformers ; Potentiometers ; Tachometers ; Null devices ; Motors and power amplifiers ; Modulators ; Phase-sensitive detectors ; Networks for operating on A.C. and D.C. error signals ; Feedback filters ; Gear-trains. Servo-design principles : Equalisation of servo loops ; Study of a specific tracking loop. Filters and servo systems with pulsed data. Statistical properties of time-variable data. R.M.S. error criterion in servo-mechanism design.

**Analog Computers**—Introduction. Adder. Multiplier. Divider. Integrator. Differentiator. Squarer. Logarithm generator. Function generator. Simultaneous equation solver. Root-finder. Differential analyser. Potential analog.

**Digital Computers**—Introduction. Input. Tele-typewriter ; Punch ; Fast input ; Phototubes. Memory : Magnetic drum ; Acoustic delay line ; Williamson's tube. Control : Registers ; Flip-Flop ; Gates—And, or, not ; Function mesh—Many to one, one to many ; Relays. Arithmetic Unit : Adder ; Subtractor ; Multiplier ; Divider. Output : Tabulator ; Neon tube ; Oscilloscope.

**Industrial Electronics**—Design of industrial rectifier equipment. Electronic voltage and current regulator. Industrial measuring aids. Industrial instrumentation and control aids. Industrial production aids. Testing and inspection aids. Electronic protection devices. Hearing aids. Biological amplifiers and medical aids. PH meter and chemical instruments. X-ray equipment and R.F. power supply systems.

**Information Theory**—Informatica. Coding. Ergodic ensembles. Entropy and information. Signal-to-noise ratio in various modulation methods. Linear correlation. Filtering and prediction.



## 2. *Radio-wave Propagation and Upper Atmosphere*

### PAPER II

General Survey—Troposphere, stratosphere, mesosphere, ionosphere, The 'fringe' region.

Physics of the Terrestrial Atmosphere—Temperature, pressure and density distribution. Height distribution of atmospheric constituents. Diffusive equilibrium. Escape of gases from the atmosphere.

Winds in the upper atmosphere—Barometric oscillations. Solar and lunar tidal variations.

Atmospheric absorption of solar radiation—Solar spectrum taken on the earth's surface. Spectra at different heights. Ozonosphere. Spectroscopic indications of upper atmospheric constituents.

Atmospheric Electricity—Lightning discharge. Nature of atmospherics. Propagation of atmospherics.

Meteoric phenomena—Meteors and meteoric showers. Theories of appearance and disappearance of meteors. Meteoric reflection of radar waves.

Auroras—Characteristics of auroras. Auroral spectrum. Height variation of auroral intensity.

Light from the night-sky—Origin. Spectrum of the night-sky light. Night-sky light and aurora.

Radio wave propagation over ground—Factors affecting ground-wave field intensity. The surface wave. Ground wave intensity with elevated antennas. Other considerations in ground wave propagation. Reflection from the surface of the earth. Electrical constants of the ground.

Tropospheric propagation—Effect of pressure and temperature variations in the troposphere. Formation of wave duct.

Ionospheric propagation—Propagation in an ionized medium. Effect of collision. Propagation in presence of magnetic field. Vertical and oblique propagation. Appleton-Hartree formula neglecting collision: Dispersion and polarization. Appleton-Hartree formula including collision: Dispersion, absorption and polarization.

### PAPER III

Formation of the ionospheric regions—Chapman's theory. Recombination and attachment processes in the ionized layers. Possible explanations of the origins of D, E, F1 and F2 regions.

Variations in the ionospheric regions—Temporal variations. Geographical variations. Sunspot cycle variations. Abnormal ionizations. Ionospheric storms.

Reflection of radio-waves from the ionosphere—Reflection at vertical incidence. Reflection at oblique incidence. Absorption of radio-wave in the ionosphere.

Ionospheric Measurements—Measurement of electron density and height. Multifrequency ionospheric recorders: automatic h'f curves. Measurement of ionospheric absorption. Measurement of polarization and angle of arrival of down-coming waves. Measurement of ionospheric winds. Measurement of collisional frequency: Luxembourg effect.

Application of ionospheric data to radio communication—Utilization of records. Prediction of ionospheric characteristics. Calculation of MUF. Ionospheric storm warning systems. Prediction of ionospheric absorption.

Sudden ionospheric disturbances. Radio radars.

Upper atmospheric conductivity and terrestrial magnetic variations—Dynamo and other theories.

## PRACTICAL

1. *Radio Engineering*

## PAPER I

- C** Power Amplifiers—Output, efficiency and distortion in Class A, B and amplifiers.  
 Transmitters—Study of various stages.  
 Transmission Lines—Impedance measurement; stub matching.  
 Frequency Modulation—Spectrum and discriminator.  
 Testing of Transmitting Valves.  
 Cavity Resonator—Resonant frequency; Q-factors.  
 Magnetrons—V-I plot, power efficiency and frequency.  
 Servomechanism—Open loop; closed loop; transient response; repetitive transients; response to random signals.

## PAPER II

Design and construction of a specified equipment.

2. *Advanced Electronics*

## PAPER I

- Vacuum Techniques—Production and measurement of vacuum, pumping speed, calibration of ion and pirani gauges.  
 Vacuum Tubes—Diode construction, testing of transmitting tubes.  
 Magnetrons—V-I plot, power, efficiency and frequency.  
 Dielectric and Induction heating.  
 Servomechanism—Open loop; closed loop. transient response; repetitive transients; response to random signals.  
 Control Circuits—Speed and temperature control.  
 Computers—Adder; subtracter; multiplier; divider.  
 Television—Qualitative study of relation between number of lines and picture quality; effect of noise.  
 Pulse Measurements—Delay; sag; rise time; velocity of propagation.  
 Transistors—Transistor characteristics; small signal parameters; noise figure.  
 Potential Analogues—Rubber membrane and electrolytic tank model.

## PAPER II

Design and construction of a specified equipment.

3. *Radio-wave Propagation and Upper Atmosphere*

## PAPER I

- Reception of R.F. Pulses—Response of a receiver to short duration pulses—Influence of steady state receiver characteristics.  
 Ionosphere Height Measurement—Plotting of P'-f curves.  
 Sky-wave Measurements—Time variation of field strength of a distant transmitter.  
 Micro-wave Propagation—Variation of micro-wave absorption in a given path.  
 Atmospherics—Measurement of direction of arrival.  
 Transmission Lines—Impedance measurement; stub matching.

## PAPER II

Design and construction of a specified equipment.

## CHAPTER XXXVII-E

The following revised Regulations and Syllabus for the Diploma Course in Social Work (Labour Welfare) were adopted :—

“(a) The written examination shall consist of eight papers instead of six as at present, the two additional papers of 100 marks each being (1) ‘Laws relating to Industries—Part II’ and (2) ‘Personnel Management.’

(b) To be placed in the First Class a candidate shall obtain 66% of marks in aggregate instead of 60% of marks as at present.

(c) The subject ‘Laws relating to Industries’ be divided into two papers of 100 marks each and shall have the following syllabus” :—

“Laws relating to Industries—Part I

*First Half*

Powers of the Central and Provincial Governments in the matter of framing legislations affecting Industry and Labour.

The Indian Factories Act, 1948.

The Plantation Act, 1954.

*Second Half*

The Indian Mines Act.

Indian Dock Labour Act.

Shops and Establishment Act.

Laws Relating to Industries—Part II

*First Half*

Trade Union Act.

Industrial Dispute Act.

Payment of Wages Act.

*Second Half*

Minimum Wages Act.

Employees’ State Insurance Act including Workmen’s Compensation Act and other relevant Acts as may be added from time to time.”

“The object of teaching the subject of Laws relating to Industries is to appreciate the general bearings of the laws in the relationship between the three parties, *e.g.*, Employers, Employees and the State.

‘Industrial Statistics Act 1942’ be added to the list of topics in subject of Statistics.”

“(d) The syllabus of the ‘Personnel Management’ courses be as stated below.”

*Personnel Management*

Introduction—Conditions necessary for establishment of industries—sources of capital—location of industries. Socio-economic changes brought about by growth of industries—social responsibilities of industries towards employees—General idea of the Profit and Loss Accounts and Balance Sheets. Objects for the enactment of the Indian Factories Act and the Indian Companies Act—Managing Agency System—Historical development of Personnel Management in India and abroad—purpose and context of a Personnel Policy—Cost of a Personnel Department relationship with other Departments.

(1) Recruitment—Man-power requirement of industry—job analysis—job description—job specification—job relation—job evaluation. Sources of Labour supply—Relation with Employment Exchange—Contacts with Heads of Schools and Colleges in order to facilitate recruitment; Interviewing Trade tests—

**Selection—Medical Examination—Placement—Introduction of new starters to foreman; Follow up of new starters; Contact of employment—Maintenance of employee records—Personal Statistics; Merit rating—Grading of employees—Promotion—Transfers—Retirement—Termination of employment procedure. Hours of work and overtime legislations relating to employment; Discipline—Methods of dealing with breaches of works rules; labour turnover—causes and analysis. Attendance at appropriate Committees relating to employment; Work Hand-book.**

(2) **Wages—Formation and maintenance of the Company's Wage structure, determination of minimum wages—Wage Committee—Authorised changes in individual rates; Assessment and control of differential rates and special payments; implementing Tribunal awards and voluntary wages agreements bonus system; Workroom and individual efficiencies; Consultations with time study or outside consultations in respect of incentives; Authorization of deduction from wages; Advance on wages; Workmen's compensation.**

(3) **Joint consultation—Negotiation with trade Unions; Conciliation and Arbitration Procedure; Joint consultations, i.e., Joint Production Committees, Works Committee, etc. Procedure for ventilating and dealing with Workmen's grievances; Industrial unrest—Trade dispute—conciliation and arbitration—Industrial relations at Factory. Statutory machineries for the avoidance and settlement of Disputes; The work, object and the achievements of the International Labour Organisation.**

(4) **Welfare (Employee Service)—Administration of Canteen Policy (Meal Service, Special Diets, Tea Breaks); Benevolent and Savings Schemes, Home Nursing; Protective clothing; Ration shops—Registration of ration cards; Co-operative Societies; Gratuity of Loans; Legal heirs; Remittance facilities; Maintenance of contact with outside Association; Visit to other Works, etc; Advice on Individual Problems; Orphanage, Pit-head Baths; Transport, Housing, Billeting, Shopping and other assistance, allotment of Houses, Line Committee, Industrial Housing Schemes; Administration of industrial colony; Marketing facilities; Provision of Social and Recreational Facilities; Music at Works; Sanitary Cloakrooms, Toilet and Washing facilities.**

(5) **Health and Safety Application of provision of Factories Act; Contact with Factory Inspectors; Liaison with Works Medical Staff; Arrangement (in co-operation with Medical Service) of Medical Examination of Employees and facilities for women workers. Health Records, Supervision of hazardous jobs, sick visiting and Convalescence; Control of communicable diseases amongst employees, etc. Fatigue Studies and Rest Pauses; Lighting, Heating, Ventilation, Accident prevention and Supervision of Safety Committees, Systematic Plant Inspection, Safety Education and Propaganda Safety Regulations, Investigation of Accidents, Accident Statistics, etc. Administration of Workmen's Compensation.**

(6) **Education and Training—Problem of illiteracy—Programme for adult education—education for workers' children, Advantages of education and training; Training of new entrants, apprentice, employees for transfer and promotion, instruction, supervisor—Contact with local education. Authorities, Government Training Centre Officials, Technical College Officials, Further education through attendance at Technical and Evening Institutes, Evening Classes, Lectures, Films, dramatic, Musical and other Societies; supervision and control of Notice Boards and Information Bulletins, Employee Handbook, Supervisors' Manual; suggestion schemes; Works tours, Library, Works Magazine."**

**Note.—The relevant Regulation as amended will read as follows :—**

**"(7. The written papers shall consist of eight papers and the Oral Examination of four papers of 100 marks each.**

In order to pass, a candidate must obtain 40 per cent of marks in each paper and 50 per cent of marks in the aggregate. Candidates obtaining 66 per cent of marks in the aggregate shall be placed in the First Class and those obtaining 50 per cent or more in the Second Class."

The papers will be renumbered as follows :—

Paper I	... Sociology.
Paper II	... Applied Economics.
Paper III	... Laws relating to Industries (Part I)
Paper IV	... Laws relating to Industries (Part II).
Paper V	... Statistics.
Paper VI	... Personnel Management.
Paper VII	... Social and Industrial Psychology.
Paper VIII	... Public Health Administration and Sanitary Laws.

The above changes in the Regulations and Syllabuses have taken effect from the examination of 1957.

#### CHAPTER XLIX-K

The following Regulations for the Diploma Course in Dermatology (Chapter XLIX-K) were adopted :—

1. An examination for a Diploma in Dermatology shall be held annually in Calcutta and shall commence at such time as the Syndicate shall determine.

2. Any Bachelor of Medicine and Surgery of this University or of any other recognised University may be admitted to this course on production of certificates of having, subsequent to passing M.B.B.S. Examination.

(i) Completed two years' continuous practice of the medical profession.

Or

(ii) Worked as a House Officer for at least six months in the Department of Dermatology in a hospital recognised by the University.

Or

(iii) Worked as a House Officer for one year in a hospital recognised by the University.

3. In order to be eligible for admission to the examination a candidate must attend a course of studies and hospital practice for a period of one year (nine months' training and 3 months' intern period) in a recognised Institution or Institutions in the subjects as defined below :—

- (i) Anatomy (including Embryology) of Skin.
- (ii) Physiology (including Bio-Chemistry) of Skin.
- (iii) Pathology of Skin Diseases.
- (iv) Bacteriology, Parasitology and Mycology of Skin affections.
- (v) Clinical aspects of Dermatology.
- (vi) Pharmacology and Therapeutics including Physiotherapy in Skin Diseases.
- (vii) General and Social aspects of Dermatology.

4. Every candidate for admission to the examination shall send his application to the Registrar through the Principal or Head of the Institution concerned, with a certificate in the form prescribed by the Syndicate and a fee of Rs. 100 at least one month before the date fixed for examination.

5. A candidate who fails to pass or present himself for the examination shall not be entitled to claim a refund of the fee. A candidate may be admitted to one or more subsequent examinations on payment of the prescribed fee on each occasion on production of a certificate from the authorities concerned of having attended a further course of instruction for at least three months.

6. Every candidate shall be examined in the following subjects :—

(a) Anatomy, Physiology, Pharmacology and Therapeutics ... One Paper

(b) Pathology and Bacteriology ... One Paper

(c) Clinical Dermatology including Symptomatology, Differential diagnosis, Management and After-care One Paper

The examination shall be Written, Oral and Practical. The Practical Examination shall include a clinical Test on Dermatological cases. Each Written paper shall be of three hours and shall carry 100 marks. 100 marks shall be set for an Oral Examination as also for the Practical Examination.

Minimum marks required for passing shall be as follows :—

Subjects	Written Full marks	Oral Full marks	Written and Oral Pass marks	Clinical and Practical Full marks	Clinical and Practical Pass marks	Total Full marks	Total Pass Marks
(a) Anatomy, Physiology, Pharmacology and Therapeutics.	100	...	40	...	...	500	250
(b) Pathology and Bacteriology	100	50	60	...	...		
(c) Clinical Dermatology.	100	50	60	100	50		

7. After having passed the Examination a candidate will be required to present case records of 25 patients which he has personally examined and treated during the period of intern for 3 months and fully written up with the approval of the Professor-in-charge of the Institution concerned. On completion of this the candidate shall send to the Registrar his application with a certificate in the form prescribed by the Syndicate for the grant of the Diploma and the Syndicate, on being satisfied that he is qualified for the Diploma, shall cause his name to be published in the Gazette. He shall thereupon receive the Diploma in the form prescribed.

8. The limits of the subjects and the detailed syllabuses shall be as defined below, which may be altered from time to time by the Academic Council on the recommendation of the Board of Undergraduate Studies in Medicine.

Emphasis will be laid more on principles than on details.

(a) Anatomy, Embryology, Histology, Cytology and Physiology of the Skin and its appendages, muco-cutaneous surfaces and contiguous mucous membranes.

(b) Pharmacological action of the drugs and therapeutic effects of medicines used in Dermatology as well as Electro X-Ray Therapy.

(c) Pathology, Bacteriology, Haematology, Parasitology and Mycology in relation to diseases of the skin.

(d) Diseases of the skin, its appendages, diseases of muco-cutaneous surfaces and contiguous mucous membranes.

(e) Tropical Dermatology including Deficiency Dermatoses and Leprosy.

(f) Diseases of the Skin as a Social Problem.

The course of study for the examination shall be as follows :—

*Theoretical (Total 50 lectures)*

(1) Introductory :—

Skin diseases in relation to Society.  
Classification of skin diseases.  
General Symptomatology.  
General Etiology.  
General Pathology.  
General Diagnosis.  
General Prognosis.  
General Therapeutics.

(2) Anatomy and Histology of the Skin :—

Growth and replacement of the skin.  
Difference in the character of skin in different regions.  
Skin pigmentation.  
Cutaneous glands.  
Hair and Nail growth.  
Blood supply of the skin.  
Lymphatics of the skin.  
Structure of the skin.

(3) Chemistry, Physiology and Functional Pathology of the Skin.

Biochemistry of Components of the Skin :

Proteins  
Fats  
Carbohydrates  
Electrolytes  
Waters  
Enzymes  
Vitamins  
Sweat

Physiology :

Permeability  
Epidermal secretion  
Respiration  
Melanin pigmentation  
Secretion  
Perspiration  
Sensation  
Heat regulation  
Protection  
Size of the skin  
Nutrition of the skin

Hormones

Structural and Functional Pathology.  
Inflammation of the skin.  
Vascular response  
Lymphatic reactions  
Regeneration

(4) Pathology, Bacteriology, Parasitology, Mycology, etc :—

Pathological changes of the epidermis.  
Pathological changes of the corium.  
Cells of the corium.  
Pathological changes of dermal appendages.  
Lesions of the skin associated with bacterial infection.  
Identification of pathogenic bacteria  
Experimental transmission of skin diseases.  
Skin diseases in animals communicable to man  
Host-Parasite relationship.  
Influence of bacteria upon healing.  
Autogenous disinfection of the skin.  
Parasitology in relation to dermatology.

Phylum Protozoa  
 Phylum Nematelminthes  
 Phylum Arthropoda.  
 Order Anoplura or Lice.  
 Order Acarina.  
 Order Diptera.  
 Order Hemiptera.  
 Order Siphonaptera, etc.

**Mycology in relation to Dermatology :**

Dermatophytes.  
 Parasitism of Dermatophytes.  
 Cultivation of the fungus.  
 Moniliais.  
 Systemic mycosis.  
 Allergy and dermal hypersensitivity to dermatophytes.

**(5) Diseases of the Skin, its Appendages, Muco-cutaneous surfaces and Mucous membrane. :—**

Acne and Seborrhoeic Dermatoses.  
 Pruritus (symptomatic and essential, psychogenic implications).  
 Eczematous Dermatoses.  
 Urticaria, Toxic Erythemas and Drug Eruptions.  
 Collagen-diseases of the skin.  
 Vesiculo-Bullous disorders.  
 Occupational dermatoses.  
 Maculo-Papulo-Squamous diseases.  
 Pyoderma.  
 Fungus infections.  
 Tuberculosis of the skin and Allied disorders.  
 Syphilis.  
 Virus and other infections including venereal diseases other than Syphilis.  
 Diseases due to animal parasites.  
 Hyperpigmentations, Dipigmentations and Atrophy.  
 Congenital (Nevoid) anomalies.  
 Disorders of the mucous membranes.  
 Diseases of the Nails and Hair and other organs relating to skin.  
 Diseases due to physical agents.  
 Benign tumors of the skin.  
 Metabolic disorders.  
 Premalignant and Malignant tumors.

**(6) Tropical Dermatology including Deficiency Dermatoses :—**

Yaws	Dermatoses due to vitamin
Leprosy	and Nutritional deficiency
Oriental Sore	and excess.
Velts' Sore, Naga Sore, etc.	Vitamin A
Ulcus Tropicus	Vitamin B Complex
Dermal Leishmaniasis	Vitamin C
Prickley Heat	Vitamin D
	Vitamin K
	Vitamin E

**(7) Treatment :—**

Tropical Medications  
 Systemic Medications.  
 Physical Agents.



Heliotherapy.  
 Radiation.  
 Ionisation.  
 Surgical procedures, including electro-surgery.  
 Refrigeration.

Psychotherapy  
 Modern trends in therapy.  
 Dermatologic Formulary.

(8) Prevention of Cutaneous diseases and Rehabilitations of patients suffering from Cutaneous disease.

(9) Social Aspects of Dermatology.

### PRACTICAL (including Demonstrations)

Total 180 hours

#### *Bacteriology and Parasitology*

	Hours.
(1) Smear examinations with different stains ...	5
(2) Demonstrations of the Cultural Characters of different types of infective organisms including fungus. ...	14
(3) Examinations of Scales and Crusts for evidence of Fungus ...	4
(4) Demonstrations of animal parasites ...	2

#### *Pathology*

(1) Examinations of body fluids for evident findings ...	2
(2) Examinations of blood for different tests ...	...
(3) Different Skin Tests and readings ...	2
(4) Examination and Demonstration of Skin Slides ...	16
(5) How to prepare histopathological skin sections and different staining methods for staining skin sections. ...	10

#### *Clinical*

(1) Demonstrations of Cases including Syphiloderm ...	100
(2) Demonstrations of Dermographism ...	1
(3) Demonstration of Nikolsky's sign and Halogen Test ...	1

#### *Therapeutics*

(1) Demonstration of special therapeutic measures adopted in the skin treatment ...	4
(2) Demonstration of Special Physio-therapeutic apparatus used in the skin treatment ...	4
(3) Demonstration of Physiotherapy in relation to skin diseases ...	10
(4) Rehabilitations ...	1
Total ...	180

## CHAPTER XLI

The following changes in Chapter XLI of the Regulations relating to Law Examinations were made :—

(i) That Regulations 4 and 5 of Chapter XLI be replaced by the following :—

“4. The following shall be the subjects for the Preliminary, Intermediate and Final Examinations, respectively :—

*For the Preliminary Examination*

Paper I	(i) Jurisprudence	...	...	...	50 marks
	(ii) Roman Law	...	...	...	50 marks
Paper II	Hindu Law including selected texts as may be prescribed.				100 marks
Paper III	(i) The Law of Contracts (including selected portions of the Contract Act and the Sale of Goods Act).				60 marks
	(ii) The Law of Torts	...	...	...	40 marks
Paper IV	(i) Constitutional Law (Indian Constitution selected portions).				70 marks
	(ii) General Principles of English Constitutional Law (Selected topics).				30 marks

*For the Intermediate Examination*

*Group A. Compulsory Subjects—*

Paper I	(i) Principles of Equity (with selected portions of the Indian Trust Act).				50 marks
	(ii) Specific Relief Act (Selected portions)	...			20 marks
	(iii) Elements of the English Law of Real Property				30 marks
Paper II	(i) History of Land Laws in Bengal and the Law relating to Property (Topics as may be prescribed).				50 marks
	(ii) Land Revenue Laws (Portions as may be prescribed).				30 marks
	(iii) The Law relating to Prescription and Easements.				20 marks
Paper III	(i) The Law of Transfer inter Vivos	...			80 Marks
	(ii) Registration (Selected topics)	...			20 marks

*Group B. Any One of the following subjects—*

Paper IV	(a) Selected topics of Company Law and Law of Partnership	...			70 marks
		...			80 marks

Or,

- (b) The Law relating to income Tax (Portion to be prescribed) 50 marks  
 The Law relating to Estate Duty (Selected topics) 30 marks  
 The Law of Sales Tax (Portions to be prescribed) 20 marks

Or,

- (c) Indian Succession Act (Portions to be prescribed) 70 marks  
 Mohammedan Law (Portions to be prescribed) 20 marks

Or,

- (d) (i) Workmen's Compensation Act ... 80 marks  
 (ii) Industrial Disputes Act ... 40 marks  
 (iii) Factories Act and Trade Union Act ... 30 marks

*For the Final Examination*

*Group A. Compulsory Subject—*

- Paper I (i) General Principles of Civil Procedure ... 40 marks  
 (ii) General Principles of Limitation (Limitation Act excluding Articles). 30 marks  
 (iii) General Principles of Law of Evidence ... 30 marks  
 Paper II (i) Public International Law ... 60 marks  
 (ii) Conflict of Laws ... 40 marks  
 Paper III (i) The Law of Crimes ... 60 marks  
 (ii) General Principles of Criminal Procedure ... 40 marks

*Group B. Any one of the following—*

- Paper IV (i) Drafting and Conveyancing ... 30 marks  
 (ii) Construction of Deeds and Statutes 40 marks

Or

- (b) (i) The Law of Bailments, Surety, Agency and Indemnity. 70 marks  
 (ii) Negotiable Instruments Act ... 30 marks

Or

- (c) (i) The Law of Arbitration ... 30 marks  
 (ii) The Law of Insurance ... 40 marks

5. The limits of each subject mentioned in the preceding regulation shall be indicated by the Academic Council from time to time after considering the recommendations made by the Board of Post-Graduate Studies in Law by reference to Text-Books, and Legislative Acts and Statutes where necessary. The allocation of marks under different sub-heads in each paper may be altered by the Academic Council after considering the views of the Faculty of Law and the Board of Post-Graduate Studies in Law. The Academic Council shall also prescribe in connection with each subject (other than subjects (i) and (ii) in Paper I for the Preliminary Examination) a list of leading cases to be studied in the original judgement as expositions of important legal principles. Every college teaching up to the L.L.B. Standard shall make suitable provision for a Law Library so as to enable its students to have access to the reports or other books in which the selected cases may be found."

(ii) That in line 1 of Regulations 16 of Chapter XLI for the words "The third paper" substitute "the Second and the Third Papers."

## CHAPTERS XLIV and XLV

The following new Regulations and Syllabuses of Studies for the M.B.E.S. Examination were adopted :—

**FIRST M.B.B.S. EXAMINATION**

1. Any undergraduate of the University may be admitted to this examination provided he has fulfilled the following conditions :—

(a) That he has attained the age of seventeen years on or before 31st December of the year of his admission into a college of Medicine affiliated to the University.

(b) That he has passed the Intermediate Examination in Science with Physics, Chemistry and Biology.

(c) That he has attended a regular course of study, Theoretical and Practical, for not less than two years at a College of Medicine affiliated to the University up to the standard of the First M.B.B.S. Examination, subject to the provision in clause 3 below.

2. The examination shall be held twice in each year, ordinarily in May and November, and shall commence on such dates as the Syndicate shall determine. Every candidate for admission to this examination shall send to the Registrar his application with a certificate in the form prescribed by the Syndicate and the fee of Rupees Fifteen for Part I, Rupees Thirty-five for Part II or Rupees Fifty for Parts I and II, at least twenty-one days before the date fixed for the commencement of the Seminar Examination. No separate fee will be charged for the Seminar Examination. A candidate who fails to pass or present himself for examination shall not be entitled to claim a refund of the fee, but he may be admitted to one or more subsequent examinations on payment of the prescribed fee on each occasion on producing a certificate that he has, since the date of the last examination and within six months preceding the examination at which he intends appearing, attended to the satisfaction of the Principal of the College a further course of study in the subject or subjects for that examination in which he had failed.

3. The First M.B.B.S. Examination shall be divided into two Parts as shown below—

Part I—Organic and Physical Chemistry.

(This may be taken at the end of the first year).

Part II—(i) Anatomy.

(ii) Physiology.

The examination shall be Written, Oral and Practical.

The examination in Organic and Physical Chemistry shall consist of—

- (a) One Theoretical Paper,
- (b) A Practical Examination, and
- (c) An Oral Examination.

The examination in Anatomy shall consist of—

- (a) Two Theoretical Papers,
- (b) A Practical Examination, and
- (c) An Oral Examination.

The examination in Physiology shall consist of—

- (a) Two Theoretical Papers,
- (b) A Practical Examination, and
- (c) An Oral Examination.

Three hours shall be allowed for each paper in each subject.

Candidates who passed the B.Sc. Examination in Chemistry shall attend the theoretical and practical classes and shall have to pass the examination in the subject like those who have passed the I.Sc. Examination.

4. (c) In addition to the Regular University Examinations, Seminar Examinations, which shall be College-cum-University Examinations, shall

be held once a year in each subject, six weeks before the regular University Examinations in May and to make the Seminar Examinations feasible, the Medical Colleges shall follow the chronological order laid down in the syllabus of studies. Candidates shall appear in one Seminar Examination in a subject where the course of study is for one year and at two Seminar Examinations where the course of study is extended for two years.

(ii) The Seminar Examination shall be conducted by and at the college in which the candidates take their training. It will consist of an Oral and a Practical Examination in each subject.

(iii) Twenty-five per cent. of each Oral and Practical Examination full marks in each subject at the Final University examination shall be allocated to each Seminar Examination. Marks obtained in a subject by a candidate at the Seminar Examination will be added to the marks obtained in that subject at the University Examination for final assessment. In assessing marks at the Seminar Examination the examiners shall take into account the records of the work done in the Practical classes by the students during their period of study which should be duly attested by the teachers in the subjects in Part I and Part II.

(iv) There shall be 50 per cent. external examiners from sister colleges under the University for the Seminar Examinations.

5. In order to pass the First M.B.B.S. Examination a candidate must pass in all subjects of Part I and Part II.

A candidate who fails to pass or to appear in Part I and/or Part II may appear in the subject or subjects in which he failed to pass or to appear at subsequent examinations provided that the two parts of the examination shall be completed within a period of nineteen months from the date when the complete examination becomes due for the first time.

After this period of nineteen months, a candidate will be required to prosecute a further course of study in all subjects of Part I and Part II to the satisfaction of the Principal of the college.

6. As soon as possible after the examination the Syndicate shall publish a list of successful candidates arranged in alphabetical order. Every candidate shall, on passing, receive a certificate in the form entered in Appendix A. Candidates who obtain at least 75 per cent. of marks in any subject shall be deemed to have passed with Honours in that subject, provided the candidate has passed in all parts of the First M.B.B.S. Examination in his first attempt.

On the recommendation of the examiners in a particular subject a Gold Medal may be awarded to a candidate who has particularly distinguished himself in Honours in that subject for that examination.

7. The full marks including marks of Seminar Examinations, for each subject and the minimum marks required for passing shall be as follows :—

	Written Full Marks	Oral Full Marks	Written and Oral Pass Marks	Practical Full Marks	Practical Pass Marks	Total Full Marks	Total Pass Marks
<b>Part I—</b>							
Organic and Physical Chemistry.	100	50	60	50	25	200	100
<b>Part II—</b>							
Anatomy	... 200	100	120	100	50	400	200
Physiology	... 200	100	120	100	50	400	200

8. The course of study for the First M.B.B.S. Examination shall be as follows :—

- (i) Organic and Physical Chemistry.
- (ii) Physiology.
- (iii) Anatomy.
- (iv) Introduction to normal Psychology.

*Note.*—The demonstration of structure and function in the teaching of Anatomy and Physiology should be correlated and done as far as possible on the living subject and should include information obtained from Radiology. No examination in subject (iv) will be held at this stage.

9. The minimum number of lectures and Practical classes will be as follows :—

I. Organic and Physical Chemistry—Lectures, 40. Practical classes, 25 (of two hours each).

- II. Anatomy—(a) Lectures—100 (2 courses of 50 lectures each).
- (b) Dissection of the cadaver and study of the dissected specimen.
- (c) Practical classes on Micro-Anatomy—25 (of two hours each).

III. Physiology.

- (a) Lectures—100 (2 courses of 50 lectures each).
- (b) Practical classes in Biochemistry—25 (of two hours each).
- (c) Practical classes in Experimental Physiology—25 (of two hours each).

Each year shall be divided into two terms, viz., Summer term from January to June and Winter term from July to December.

10. The following are the Syllabuses for the subjects mentioned in rule 8 above and they may be modified by the Academic Council from time to time on the recommendation of the Board of Undergraduate Studies in Medicine and the Faculty of Medicine.

## (I) ORGANIC AND PHYSICAL CHEMISTRY

### ORGANIC CHEMISTRY

#### *Theoretical*

Definition and recognition of Organic Compounds. Isolation and purification of Organic Compounds. Criteria of Purity—determination of melting and boiling points.

Composition of Organic Compounds. Detection of the elements—Carbon, Hydrogen, Nitrogen, Sulphur, Phosphorus, Arsenic and the Halogens in Organic Compounds.

Quantitative analysis. Determination of molecular weight, Determination of formulae.

Isomerism, Metamerism, Polymerism, Tautomerism and Stereo-isomerism, Optical activity.

Hydrocarbons—Saturated (Ethane and Methane) and unsaturated (Ethylene and Acetylene). Halogen derivatives—Chloroform, Carbon tetrachloride and Iodoform.

Alcohols—Saturated and Unsaturated (Methyl, Ethyl, Glycerol and Allyl).

Ethers—Ethyl Ether.

Aldehydes—Formaldehyde, acetaldehyde and chloral.

Ketones—Acetone.

Fatty acids—Saturated (formic, acetic, butyric, palmitic and stearic) and Unsaturated (oleic, linoleic and linolenic acids).

Lactic, oxalic, tartaric and citric acids.

Glycuronic acid.

Amino-acids—glycine, histidine, leucine and tyrosine.

Acetyl chloride and acetic anhydride.  
 Esters—ethyl acetate and amyl nitrite.  
 Amines and Amides—ethylamine, histamine and acetamide.  
 Fats, oils and waxes—especially those relating to foodstuffs and medicine.  
 Hydrogenation. Saponification. Sterols.  
 Carbohydrates—glucose, fructose, cane sugar, lactose, maltose, starch, dextrin, glycogen, inulin and cellulose.  
 Cyanogen compounds—Hydrocyanic acid, Cyanides and Ferro-cyanides.  
 Uric Acid and Caffeine and their general reactions.  
 Aromatic Compounds—Preparation and properties of Benzene, Toluene, Benzene—sulphonic acid, Nitrobenzene, Aniline, Benzyl-alcohol, Benzaldehyde, Mandelic acid, Benzoic acid, Salicylic acid, Phenol, Resorcinol, Pyrogallol and Gallic acid. Tannic and picric acids, Naphthalene.  
 Heterocyclic—Pyridine, Quinoline and Pyrrole.  
 Alkaloids—Sources and general properties of Quinine, Morphine and Atropine.  
 Glycosides—general properties of Amygdalin and Digitoxin. A general knowledge of proteins and enzymes.  
*N.B.*—The whole course of Organic Chemistry will be treated in an elementary way and, as far as possible experimentally, with special reference to the needs of medical students.

### *Practical*

Practical demonstrations, where feasible, on crystallisation, vacuum and steam distillations, determination of melting and boiling points, polarimetry and determination of pH.

Individual work by the students on—

1. Detection of C, H, N, S, P, As and the Halogens in Organic Compounds.
2. General reactions and tests for methyl alcohol, ethyl alcohol, glycerol, chloral, ethyl-ether, formaldehyde, acetaldehyde, acetone, chloroform, carbon tetrachloride, iodolorm, cyanides, glucose, sucrose, lactose, maltose, starch, dextrin, urea, uric acid; formic, acetic, oxalic, lactic, tartaric, citric, benzoic, salicylic, gallic and tannic acids and phenol.
3. Preparation of Osazones.
4. Saponification of fats and oils, preparation of fatty acids.
5. Quantitative estimation of glucose and uric acid.

*N.B.*—In assessing marks at the Seminar Examination the examiners will take into account the records of the Practical work of the candidate duly attested by the Professor.

## PHYSICAL CHEMISTRY

A short course which shall include the study of the following :—

Theory of solution, Ionic theory, Electrolytes, Hydrogen-ion concentration and pH. Buffers, Colloids, Adsorption. Osmosis, Surface tension, Catalysis, Mass action and Reversible reactions, Radio-activity. Isotopes.

## (II) PHYSIOLOGY

### *Theoretical*

*First-year—(Winter Term)*

(1) Introduction :

Fundamental phenomena of life. The cell and its differentiation, Tissues and organs of the body.

(2) Biochemical principles :

Elementary constituents of protoplasm. Chemistry of Proteins, Carbohydrates and Lipides.

(3) Biophysical principles :

Osmotic pressure. H-ion concentration. Neutrality regulation. Properties of colloids. Adsorption. Electrical Phenomena in living tissues. Enzyme action and Catalysis.

(4) Nerve Muscle Physiology :

Excitation process in a nerve and its propagation. Changes undergone by a nerve on stimulation. Polarisation Phenomena in nerve. Electrotonus. Reaction of Degeneration. Neuro-muscular transmission. Different types of muscles in the body. Changes on excitation and nature of the contractile process. Physiology of muscular exercise.

(5) Alimentation. Metabolism, Nutrition and Dietetics :

Normal diets. Vitamins. Milk—its properties. The digestive organs and their structure and functions. Gastro-intestinal hormones. Liver. Movements of the alimentary canal. Absorption of the foodstuffs and their metabolism. Biological value of proteins. Blood sugar and its regulations. Mineral metabolism and Metabolism during starvation. Nutrition of an individual.

*First-year (Summer term)*

(6) The Circulatory System :

Blood. Regulation of blood volume and its determination. Specific gravity of blood. Reaction of blood and its regulations. Composition and functions of blood plasma. Plasma proteins—their origin and functions. Red bone marrow. Origin, composition, fate and functions of the formed elements. Chemistry of haemoglobin and its compounds and derivatives. Coagulation of blood. Haemolysis. Blood Groups.

*Heart :*

Structure and properties of cardiac muscle. Cardiac cycle. Action of valves. Heart sounds. Apex beat. Endocardiac pressure. Nutrition of the heart and Coronary circulation. Electrocardiogram. Output of heart. Origin and propagation of the cardiac impulse. Nervous regulation of heart. Cardiac reflexes.

Vascular system : Course and Circulation of blood. Structure of arteries, capillaries and veins. Peculiarities of Cerebral, Pulmonary, Hepatic, Portal and Renal circulations. Time of complete circulation. Velocity of blood flow. Pulse—arterial and venous. Innervation of blood vessels and control of circulation. Blood pressure and its regulation. Control of capillary circulation.

(7) The Reticulo-endothelial System : Spleen—Lymphatic glands.

(8) Tissue Fluid. Lymph and tissue fluids, Oedema.

(9) The Respiratory System :

Anatomy and minute structure of the respiratory organs. Mechanism of respiratory movements. Spirometry. Chemistry of respiration. Composition of inspired, expired and alveolar air. Respiratory quotient. Basal Metabolism. Gases in blood and their tension. Transport of oxygen and carbon dioxide in blood. Mechanism of external and internal respiration. Control of respiration. Cheyne-Stokes respiration. Apnoea, Dyspnoea, Anoxia, Cyanosis, Asphyxia. Effects of high and low atmospheric pressure. Acclimatisation. Mountain sickness. Caisson disease. Artificial respiration. Effects of respiration on circulation.

*Second-year—(Winter term)*

(10) The Sense Organs :

General features. Classification of sensations. Sensory end organs. Sensory pathways.



(a) *Vision*—Anatomy of the eye. Errors of refraction and their correction. Mechanism of accommodation. Structure and functions of the coats of the eye-ball. Ocular reflexes. Visual field. Visual pathway. Colour vision. Colour blindness. Binocular vision.

(b) *Hearing*—Structure of auditory apparatus. Conduction of sound waves. Helmholtz Theory. Cochlear response. Vestibular apparatus.

(c) *Taste and Smell*—Structure and function of the receptor organs.

(d) *Cutaneous and Deep Sensation*—Structure and function of the receptor.

(11) *Voice and Speech*. Anatomy of the larynx. Mechanism of the production of voice and speech.

(12) *The Endocrine organs* :

(13) *Reproduction* :

Primary and secondary—Sex organs and secondary sex characters. Mammary gland and prostate. Placenta and its functions. Foetal respiration and circulation.

*Second-year (Summer term)*

(14) *The Excretory System* :

Kidney : Formation and chemical composition of urine. Structure and functions of the Kidney. Constituents of Urine—normal and abnormal. Volume of urine. Physiology of micturition. Renal efficiency tests.

(15) *The Integumentary System* :

Structure and functions of the skin. Formation, composition and secretion of sweat and sebum. Body temperature and its regulation.

(16) *The Nervous System* :

General features of the central nervous system. Structure and functions of the spinal cord. Reflex action in animal and in man. Reciprocal innervation. Structure, connection and functions of the Midbrain, Pons and Medulla. Functions of the Corpus Striatum, Thalamus, Hypothalamus. Distribution and functions of cranial nerves and spinal nerves. Structure, connections and functions of the cerebrum and cerebellum. Localisation of functions of the cerebral cortex. Conditional reflexes. Cerebrospinal fluid. The autonomic nervous system. Chemical transmitters. Regulations of posture and equilibrium. Labyrinthine sensations.

## PRACTICAL

### A. Biochemistry (Practical).

The chemical tests of proteins and their cleavage products. Emulsification and saponification of fats. Tests for glycerol, cholesterol. General reactions and distinguishing tests for monodi and polysaccharides of physiological importance. The qualitative analysis of milk, and composition of saliva. Examination of gastric contents and the estimation of total acidity, free HCl and combined acid. Actions of ptyalin and pepsin. Haemoglobin, its principal derivatives and compounds. Chemistry of blood and bile. Detection of substances of Physiological importance.

Urine—Examination of normal and abnormal constituents and of urinary sediments. Quantitative examination for sugar, chlorides, phosphates, urea and albumin.

### B. Biochemistry (Demonstration).

Blood—Quantitative estimation of glucose, NPN, urea, uric acid, creatinine, calcium, cholesterol.

Urine—Estimation of ammonia, uric acid, creatinine and acetone bodies.

Chemistry of cerebro-spinal fluid. Analysis of inspired, expired and alveolar air. Use of Douglas bag. Polarimeter. Colorimeter.

### C. Biophysics (Demonstration).

Experiments illustrating the practical applications of the following phenomena to physiological processes.

Filtration. Diffusion. Surface-tension. Viscosity. Hydrotrophy. Osmosis. Colloidal state. Adsorption. H-ion concentration. Permeability of cell membrane.

#### D. Experimental Physiology (Practical).

Setting up the apparatus for electrical stimulation of the tissues and for recording their activities. Use of induction coil, keys, commutators, rheocord, myograph and revolving drums. Nerve-muscle preparation. Excitation by different types of stimuli: simple muscle curve, effects of temperature and load, calculation of work done by the muscle, effects of fatigue, effects of successive stimuli. Genesis of tetanus. Velocity of nerve impulse.

Frog's Heart: Normal heart tracing, effects of warming and cooling the sinus, vagal inhibition, effects of ions and drugs, first and second Stannius ligatures, all or none law, staircase phenomenon, refractory period, extra systole and compensatory pause.

#### Experimental Physiology (Demonstration).

Electrical changes in muscle and nerve during activity, Electrotonus. Pflüger's law of contraction. Capillary circulation in frog. Perfusion of mammalian and frog's heart. Recording blood pressure in animals. Intestinal movements and uterine contractions by Dale's apparatus.

E. List of experiments which should be performed on the living human subjects as far as possible or conveniently demonstrated in the practical classes :—

##### (1) Circulatory System :

Heart—Clinical and Fluoroscopic examination. Electro-cardiogram. Response to exercise.

Blood Pressure. Sphygmomanometry—Determination at rest and after exercise. Pulse tracing—Sphygmography and Polygraphy—Radial and Jugular.

Blood—Specific gravity. Fragility and sedimentation rate of R. B. C. size of R.B.C. Bleeding time, coagulation time and prothrombin time. Platelet count. Blood Grouping.

Haematocrit—Blood Plasma-Corpuscle ratio.

##### (2) Respiratory System—

Examination of the chest—inspection, palpation, percussion and auscultation. Respiratory efficiency tests. Determination of vital capacity and B.M.R. Artificial respiration. Determination of respiratory quotient. Fluoroscopic examination of chest.

##### (3) Digestive System :—

Functional efficiency tests for liver and pancreas. X-Ray examination of the gastro-intestinal tract after barium meal.

##### (4) Nervous System :—

Study of superficial and deep reflexes. Reaction time.

##### (5) Nerve muscle physiology :—

Fatigue in human muscle—Ergograph and Dynamometer.

##### (6) Special and Cutaneous senses :—

Study of cutaneous and deep sensations. Uses of aesthesiometer, perimeter and ophthalmoscope. Tests of colour blindness. Olfactometer. Experiments on taste sensations. Tests of hearing.

##### (7) Excretory System :—

Renal efficiency tests.

The written papers in Physiology shall be distributed as follows :—

PAPER I: Blood and Lymph, their circulation. Reticuloendothelial System—Spleen. Respiration. Kidney and Secretion of Urine. Micturition. Skin. Regulation of Body temperature. Sense organs.

PAPER II: Endocrine organs. Nervous system. Nerve muscle-physiology. Alimentation and metabolism—enzymes. Biochemistry of protein, Carbohydrate and Lipids. Nutrition and Dietetics. Reproduction.

### (III) ANATOMY

The curriculum should be divided under the following headings:—

*I. Gross Anatomy*—to be dealt under the following categories:—

(A) Introductory Lectures with Demonstration.

(B) Systematic Series.

The study to be covered by didactic lectures, lecture demonstrations, surface and radiological anatomy and by dissection of the cadaver and study of dissected specimen. Knowledge thus obtained together with correlation of facts should be integrated into Living Anatomy. Details of topographical relations should be stressed for those part which are of importance in general practice.

(i) Superior and Inferior Extremities, Head and Neck, Thorax, Abdomen and Pelvis—to be studied regionally and system by system. Special reference to be made to development and its anomalies, segmental innervation, functional groups of muscles in relation to joints or otherwise. Applied anatomy.

(ii) Endocrine Organs—with special reference to development and applied anatomy.

*II. Developmental Anatomy*—General principles of development and growth and the effect of hereditary and environmental factors—to be given by lectures, charts, models and slides.

*III. Neuro-Anatomy*—Gross anatomy of brain and spinal cord and the main nerve tracts. The peripheral nerves. Cranial nerves—their nuclei, course and distribution. Autonomic nervous system. Development and anomalies. Applied anatomy.

The study to be covered by lectures, lecture-demonstrations, dissection of brain and cord, and clinical co-relations.

*N.B.*—The practical study should precede the study of physiology of nervous system. Early correlation with the clinical course is desirable.

*IV. Micro-Anatomy (Histology)*—Practical—The compound microscope. Staining of fresh tissues; epithelial, endothelial and connective tissues, nerve, muscles, etc. and preparation and staining of blood films (frog and man).

*Blood*—Differential Count. Staining and identification of cells of bone marrow. Film preparation. Haemocytometry.

Staining and identification of section of different mammalian tissues.

*Demonstration*: Methods of preparation, embedding and cutting of paraffin and frozen sections and their staining.

#### 1ST-YEAR

(a) *Winter term*—

General Anatomy and Embryology.

(b) *Summer term*—

Inferior Extremities, Thorax and Abdomen.

#### 2ND-YEAR

*Winter term*—

Superior Extremities, Head and Neck.

*Summer term*—

Neuro-Anatomy, Micro-Anatomy, Head and Neck.

The written papers in Anatomy shall be distributed as follows:—

Paper I Head-Neck, Central Nervous System, Special Senses and Superior Extremity.

Paper II Thorax, Abdomen and Pelvis, Inferior Extremity.

### (IV) INTRODUCTION TO NORMAL PSYCHOLOGY

*Lectures*—

(a) definition of Psychology as a Science and its difference from other Sciences.

- (b) Conception of the mind.
- (c) Mesmer and his theory. Hypnotism structure of consciousness.
- (d) Freud and his theory—Dynamics of the unconscious. Development of the libido.
- (e) Other contemporary schools of Psychology.
- (f) Relation between mind and body in health and disease.
- (g) Perception. Imagination. Ideation. Intelligence Memory.
- (h) Cognition. Conation. Affect. Instinct. Sentiment. Behaviour.

## CHAPTER XLV

### FINAL M.B.B.S. EXAMINATION

1. Any candidate who fulfils the following conditions may be admitted to this examination :—

- (a) That he has passed the First M.B.B.S. Examination at least three years previously.
- (b) That he has completed a regular course of study, theoretical and practical, in the subjects of the examination extending over a period of at least three years subsequent to his passing the First M.B.B.S. Examination in a College of Medicine affiliated to the University to the Final M.B.B.S. standard, subject to the provision in clause (3) below.

2. The Final M.B.B.S. Examination shall be divided into three parts, Part I, Part II and Part III, embracing subjects as defined hereafter.

The examination in each part shall take place twice in each year, ordinarily in May and November, and shall commence on such dates as the Syndicate shall determine. Every candidate for admission to the examination shall send to the Registrar his application with a certificate in the form prescribed by the Syndicate and a fee of Rs. 40 for each part of the examination, at least twenty-one days before the date fixed for commencement of the Seminar Examination. No separate fee will be charged for the Seminar Examination. A candidate who fails to pass or present himself for the examination shall not be entitled to claim a refund of the fee, but may be admitted to one or more subsequent examinations in that part on payment of the prescribed fee on each occasion on producing a certificate that he has since the date of the last examination and within six months preceding the examination which he intends appearing at, attended to the satisfaction of the Principal of the College a further course of study in each of the subjects in which he had failed or did not appear at the previous examination.

A candidate may appear in Part I at the end of the 3rd-year and Part II at the end of the 4th-year. A candidate may, however, take up at the end of the 5th-year Part I, Part II and Part III separately or together.

3. Every candidate shall be examined in the following subjects :—

#### Part I

Pharmacology ... This may be taken at the end of the 3rd-year

#### Part II

Group A Pathology, Bacteriology and Parasitology.	}	These may be taken at the end of the 4th-year together or separately.
Group B Preventive and Social Medicine.		
Group C Forensic and State Medicine.		

#### Part III

Group A Medicine including Clinical Therapeutics, Applied Anatomy and Physiology, Clinical Pathology, Children's diseases, Skin diseases and Mental diseases.

**Group B (i) Surgery including Applied Anatomy and Physiology, Clinical Pathology, Clinical Therapeutics, Anaesthesiology, Radiology, Orthopaedics, Venereal diseases, Dental diseases and Surgical diseases of infancy and childhood.**

**(ii) Ophthalmology and Diseases of Ear, Nose and Throat.**

**Group C Obstetrics and Gynaecology and Infant Hygiene including Applied Anatomy and Physiology, Clinical Pathology and Clinical Therapeutics.**

The examination shall be Written, Oral, Practical and/or Clinical as provided hereunder, three hours being allowed for each paper.

The examination in Pharmacology and Therapeutics shall consist of :—

(a) One Theoretical Paper. An average of at least half-an-hour should be allowed to answer each question.

(b) An Oral examination.

(c) A Practical examination, including practical pharmacy.

The examination in Pathology, Bacteriology and Parasitology shall consist of :—

(a) One Theoretical Paper. An average of at least half-an-hour should be allowed to answer each question.

(b) A Practical examination.

(c) An Oral examination including questions on macroscopic and microscopic specimens.

The Examination in Preventive and Social Medicine shall consist of :—

(a) One Theoretical Paper. An average of at least half-an-hour should be allowed to answer each question.

(b) An Oral examination.

The examination in Forensic and State Medicine shall consist of :—

(a) One Theoretical Paper. An average of at least half-an-hour should be allowed to answer each question.

(b) An Oral examination.

The examination in Medicine shall consist of :—

(a) Two Theoretical Papers. An average of at least half-an-hour should be allowed to answer each question.

(b) An Oral examination including questions on pathological specimens and interpretation of X-ray records and charts.

(c) A Practical examination including examination of secretions, testing of urine, Clinical microscopy and prescription writing.

(d) A Clinical examination, including Therapeutics; at least half-an-hour being allowed to the candidate for the examination of and report on his principal case.

The examination in Surgery shall consist of :—

(a) Two Theoretical Papers. An average of at least half-an-hour should be allowed to answer each question.

(b) A Clinical examination, at least half-an-hour being allowed to the candidate for the examination of and report on his principal case.

(c) An Oral examination in which questions on Surgical Pathology, X-ray records and pathological slides and specimens shall form special parts.

(d) A Practical examination in which questions on the use of surgical instruments and appliances, and on the application of splints and bandages shall form special parts. It shall include Surgical Anatomy and operation on cadaver whenever feasible.

The examination in Ophthalmology and Diseases of Ear, Nose and Throat shall consist of :—

(a) One Theoretical Paper. An average of at least half-an hour should be allowed to answer each question.

(b) A Clinical examination and the candidate's report on his principal case.

(c) An Oral examination.

The examination in Obstetrics and Gynaecology and Infant Hygiene shall consist of :—

(a) Two Theoretical Papers. An average of at least half-an-hour should be allowed to answer each question.

(b) An Oral examination including questions on pathological specimens, models and X-Ray films.

(c) A Practical examination on Obstetrics and Gynaecology including questions on instruments and appliances.

(d) A Clinical examination at least half-an-hour being allowed to the candidate for the examination of and report on his principal case.

4. (i) In addition to the Regular University Examinations, Seminar Examinations which shall be College-cum-University Examinations shall be held twice a year in each subject, six weeks before the regular University Examinations and to make the Seminar Examinations feasible, the Medical Colleges shall follow the chronological order laid down in the Syllabus of Studies. Candidates shall appear in one Seminar Examination in a subject where the course of Study is for one year and at two Seminar Examinations where the course of Study is extended for 2 years.

(ii) The Seminar Examinations shall be conducted by and at the colleges in which the candidates take their training. It will consist of an Oral, Practical and/or Clinical Examination.

(iii) Twenty-five per cent. of each Oral, Practical and /or Clinical Examination full marks in each subject at the Final University Examination will be allocated to each Seminar Examination. Marks obtained in a subject by a candidate at the Seminar Examination will be added to the marks obtained in that subject at the University Examination for final assessment. In assessing marks at the Seminar Examination the examiners shall take it into account the records of the work done by the candidates during their period of study.

(iv) There shall be 50% external examiners from sister colleges under the University for the Seminar Examinations.

5. As soon as possible after the examination in Part I, Part II or Part III the Syndicate shall publish a list of candidates who have passed, arranged in alphabetical order. Candidates who obtain at least 75 per cent. of marks in any group of either Part I, Part II or Part III shall be deemed to have passed with Honours in that group, provided that the candidate passes in all the groups of Part I, Part II and Part III in his first attempt.

On the recommendation of the examiners in a particular group a gold medal may be awarded to the candidate who has particularly distinguished himself in Honours in that group for that examination.

Every candidate, shall, on passing all the three parts of the Final M.B.B.S. Examination receive a certificate in the form entered in the Appendix A.

6. In order to pass the Final M.B.B.S. Examination a candidate must pass in Parts I, II and III of the examination.

In order to pass in Part I of the Final M.B.B.S. Examination a candidate must pass in Pharmacology.

In order to pass in Part II of the Final M.B.B.S. Examination a candidate must pass in Group A—Pathology, Bacteriology and Parasitology, in Group B—Preventive and Social Medicine and in Group C—Forensic and State Medicine.

In order to pass in Part III of the Final M.B.B.S. Examination a candidate must pass in Group A—(i) Medicine and Therapeutics, in Group B—(i) Surgery and (ii) Ophthalmology and Diseases of Ear, Nose and Throat, and in Group C—Obstetrics and Gynaecology and Infant Hygiene.

A candidate who fails to pass or to appear in Part I or in one or more groups of Part II and Part III of the Final M.B.B.S. Examination may be examined in the group or groups in which he has failed or did not appear at a subsequent examination. Provided that the examination shall be completed within a period of nineteen months from the date of appearing for the first time in Part III of the Final M.B.B.S. Examination.

Provided that in case a student has only one subject to pass at the end of this stipulated period of nineteen months he will be allowed to appear at the next examination in that particular subject and shall complete the examination within a period of 25 months from the date of appearing for the first time in Part III of the examination.

After this period of twenty-five months a candidate will be required to prosecute a further course of study in all subjects of Part III to the satisfaction of the Principal of the College provided that he has already passed in all the groups of Part I and Part II.

7. The full marks for each subject and the minimum marks required for passing are as follows :—

	Written Full marks	Oral Full marks	Written & Oral Pass marks	Pract and/ or Clinical Full marks	Pract and/ or Clinical Pass marks	Total Full marks	Total Pass marks
<i>Part I</i>							
Pharmacology	...	...	...	50	25	200	100
<i>Part II</i>							
Pathology, Bacteriology and Parasitology	...	50	60	50	25	200	100
Preventive and Social Medicine	...	50	60	...	...	150	75
Forensic and State Medicine	...	50	60	...	...	150	75
<i>Part III</i>							
Medicine	200	100	120	200	100	500	250
{ Surgery	200	100	120	200	100	500	250
{ Ophthalmology and diseases of Ear, Nose and Throat.	100	50	60	50	25	200	100
Obstetrics and Gynaecology and Infant Hygiene.	200	100	120	200	100	500	250

*Note*—For purposes of assessing pass marks in Surgery the marks obtained by the candidate in the written, oral and clinical portions of the examination in Ophthalmology and diseases of Ear, Nose and Throat shall be added to the marks obtained in the corresponding portions of the examination in Surgery.



8. During clinical period occupying 3rd, 4th and 5th-year of study in a medical college, the student shall receive instructions in the subjects of Part I, Part II, and Part III of the Final M.B.B.S. Examination.

9. The minimum number of lectures will be as follows :—

Pathology, Bacteriology and Parasitology	...	60	Lectures or Demonstrations
Preventive and Social Medicine	...	40	Do.
Forensic and State Medicine	...	30	
Medicine including Therapeutics	...	80	
Mental Disease	...	8	
Pharmacology	...	30	Lectures or Demonstrations
Surgery	...	80	
Ophthalmology and Diseases of Ear, Nose and Throat	...	25	
(Ophthalmology—15, Diseases of Ear, Nose and Throat—10)			
Obstetrics and Gynaecology including practical demonstrations and Infant Hygiene	...	60	

10. The following are the Syllabuses for the subjects mentioned in rule 3 above and they may be modified by the Academic Council from time to time on the recommendation of the Board of Undergraduate Studies in Medicine and the Faculty of Medicine.

## PHARMACOLOGY

The idea of didactic lectures in Pharmacology is to give the student a clear outline of the current concept of action and uses of drugs and to provide a scientific foundation for rational therapy, without burdening him with mere factual details.

The course comprises of the following :—

- A. I. Introductory.
- II. Drugs : Sources and Nature. Principles of drug action. Absorption. Distribution. Fate and clearance. Modifying factors.
- III. Administration of drugs.
- IV. Drugs influencing metabolism and water balance.
- V. Drugs acting on the reaction of the body fluids.
- VI. Heavy metals and metalloids. Radio-active elements.
- VII. Drugs acting on the various systems :—
  - (a) Alimentary system.
  - (b) Cardio-Vascular System.
  - (c) Haemopoietic System—Blood Substitutes, Coagulants and Anticoagulants.
  - (d) Respiratory System.
  - (e) Urinary System.
  - (f) Reproductive System.
  - (g) Central Nervous System.
  - (h) Autonomic Nervous System.
  - (i) Muscles.
  - (j) Skin and Mucous membrane.
  - (k) Endocrines.
- VIII. Local and Systemic anti-infectives :—
  - (a) Antiseptics and disinfectants.
  - (b) Antibiotics and other chemotherapeutic agents.
  - (c) Immunotherapy.
- IX. Chemotherapy of Malignant diseases.
- X. Vitamins and Nutrients.
- XI. Allergic Phenomenon : Anti-histaminic drugs.

**B. Pharmacy, Incompatibility and Prescription Writing**

1. Preliminary—Pharmacy, Definition and scope. Dispensing. Prescription and its parts, weights and measures used in prescriptions. Abbreviations used in prescriptions.

2. Demonstration of Pharmaceutical preparations.

3. Dispensing of—

(a) Mixtures and Emulsions; (b) Pills; (c) Powders; (d) Plasters; (e) Ointments; (f) Lotions.

4. Practice of Prescription writing, including incompatibilities.

C. Demonstration on Experimental Pharmacology.

**PATHOLOGY, BACTERIOLOGY AND PARASITOLOGY**

The course in Pathology, Bacteriology and Parasitology should be such as to impart to the students a thorough grasp of the basic knowledge of the subjects. Instructions should be given emphasising the application of the basic principle in the 3rd- and 4th-year of medical studies.

*Autopsy*—A course of practical instructions on the conduct of necropsies and each student is to act as a Post-Mortem Clerk in a minimum of ten cases.

*Courses of study*—

**I. THEORETICAL**

A. Bacteriology—Morphology. Biology. Sterilisation. Chemotherapy. Principles of artificial media. Infection. Defence reactions. Immunity. Hypersensitivity. Skin tests.

Systematic study of bacteria: habitat, important morphological, cultural, bio-chemical, serological and toxic behaviour of the commoner pathogenic and non-pathogenic species. Pathological changes produced by disease-producing bacteria and their laboratory diagnosis.

Staphylococci, Streptococci, Diplococci, Neisseria, Mycobacterium tuberculosis (types), Mycobacterium leprae, names and differentiation of saprophytic from pathogenic mycobacteria, corynebacterium diphtheriae; Diphtheroids and their differences from Corynebacterium diphtheriae. Aerobic spore-bearing bacteria—Bacillus Anthracis and Subtilis. Anaerobes—General and Special features of the Pathogens. Names of some important non-pathogens and their roles. Gram-negative intestinal bacteria classification, identification of the pathogens—salmonella, vibrio, bacterium pasteurilla. General idea about haemophilus, pseudomonas, brucella, rickettsia, proteus. Spirochaetes—general idea, details of Treponema pallidum and Leptospiraicterohaemorrhagiae.

Virus—general characters, classification of diseases, immunological measures against some important virus diseases, e.g., Varicella, Rabies, Bacteriophage.

**B. Parasitology:**

Protozoa—classification, names of important Rhizopoda. Ent. histolytica, morphology, pathogenesis and pathogenicity, diagnosis, differences from Ent. coli.

Sporozoa—species of Plasmodia, life history and pathogenesis, differentiation of species.

Mastigophora—general broad morphological features, classification, pathogenesis, vectors. Pathology of Kala-azar. Ciliata—important features, source, disease due to Balantidium coli.

Helminths—definition of certain terms, simple classification, differences between Nematodes, Cestodes and Trematodes. Broad differentiating morphological features and broad life-history and pathogenesis of important species of Nematodes, Cestodes and Trematodes—infecting liver, lungs, intestine and blood—general life-history. Differences between Schistosomes and other Trematodes.

### C. Pathology—

(a) Principles of General Pathology: Injury, inflammation and repair, degenerations—cloudy swelling, autolytic, and post-mortem degeneration. Principles of fixation. Fatty change. Lipoid degeneration. Atheroma. Hyaline, mucoid and amyloid degenerations. Necrosis and gangrene. Disturbances of pigment, calcium and uric acid metabolism. Avitaminosis. Anaemias. Disorders of growth—metaplasia; anaplasia, atrophy, hypertrophy, hyperplasia. Neoplasm—classification—benign and malignant, spread, aetiological factors, experimental carcinogenesis, theories. Circulatory disturbances—clotting, ischoemia, thrombosis, embolism, infarction; hyperaemia, oedema, shock, ischoemia.

(b) Pathology of Special Organs: Morbid Anatomy (Macroscopic) in commoner disorders.

### II. Lectures and/or Demonstrations

#### Clinical and Chemical Pathology.

Blood—Collection for different purposes. Estimation of haemoglobin, total count of R.B.Cs., W.B.Cs., Platelets, M.C.H., M.C.V., M.C.H.C.,—significance. Differential leucocyte count. Malaria parasites, Leishmania, Trypanosomes in peripheral blood, marrow or spleen puncture material. Development of R.B.C. and W.B.C. Leukæmia. Erythrocyte sedimentation rate. Blood culture. Aldhyde and Chopin's Test. Bleeding and Coagulation time. Prothrombin time. Blood groups. Estimation of blood sugar. Sugar tolerance test. Liver function tests especially bilirubin, Vanden Bergh's reaction, Icterus index.

Fractional Test meal—interpretation of curves.

Urine—estimation of urea—urea clearance test, water diuresis test, urinary deposits.

Faeces—different ova—differentiation—Bacillary dysentery. Amoebic dysentery.

Examinations of Throat swab, Sputum, C.S.F., Ascitic and Pleural fluids.

### III. Practical.

Clinical and chemical Pathology: Estimation of Haemoglobin (by acidimetry). Count of R.B.Cs. and W.B.Cs. Staining of thin and thick films, differential count and parasites. Erythrocyte sedimentation rate. Urine—physical, chemical, microscopical, quantity of albumin and sugar. Faeces—physical, chemical (occult blood) and microscopical for ova and protozoa.

Bacteriology: Methods of sterilisation, preparation of media, use of microscope. Gram and Acid Fast stains. Motility preparation. Gram positive and Negative cocci and bacilli. Special stains for *Corynebacterium*. Gram and Acid Fast stains of Pus and Sputum.

McConkey's Plate—Sugar reactions—Gram stain and motility of Gram negative intestinal bacteria. Widal and Bordet-Durham Reactions.

Demonstration of Pasteurella and of Spirochaetes by dark field illumination—Fontana's stain—Levaditi's stain. Demonstration of methods of Anaerobiosis and of Tetanus spores.

*Pseudomonas*.

Morbid Histology:—

Practical training in methods of fixation, embedding, cutting and staining of Paraffin and Frozen sections.

Grey hepatisation, Acute appendicitis, Chronic appendicitis, Septic Liver abscess, Granulation tissue, Tuberculosis of lung, Portal cirrhosis, Fatty liver, Malaria liver, Atheroma, Papilloma, Fibroadenoma, Fibroma, Fibromyoma, Squamous-celled and Basal-celled Carcinomas, Adeno carcinoma, Scirrous carcinoma, Entephaloid carcinoma, Secondary carcinoma in lymph gland, Round and Spindle-celled sarcoma.

*3rd-year*

1. General Bacteriology.
2. Systematic Bacteriology.
3. Principles of General Pathology
4. Morbid Histology.

*4th-year*

1. Systematic Bacteriology.
2. Parasitology.
3. Pathology of Special Organs.
4. Clinical and Chemical Pathology.
5. Morbid Histology.

## PREVENTIVE AND SOCIAL MEDICINE

Instruction in this course should be given in the 3rd and 4th year of medical studies by lectures, demonstrations and field studies.

### *I. Introduction to Preventive and Social Medicine—*

Concept, Man and Society. Aim and scope of Preventive and Social Medicine. Social causes of disease and social problems of the sick. Relation of economic factors and environment in health and disease.

### *II. Physiological Hygiene—*

(a) Food and Nutrition—Food in relation to health and disease. Balanced diets. Nutritional deficiencies and nutritional survey. Food processing. Pasteurisation of Milk. Adulteration of Food and food inspection. Food poisoning.

(b) Air, Light and Sunshine.

(c) Effect of Climate—Humidity, Temperature, Pressure and other Meteorological conditions—comfort zone. Effect of overcrowding.

(d) Personal Hygiene—(cleanliness, rest, sleep, work); physical exercise and training. Care of health in tropics.

### *III. Environmental Sanitation—*

(a) Atmospheric Pollution—Purification of Air. Air Sterilisation.

(b) Water Supplies—sources and uses, impurities and purification. Public water supplies in urban and rural areas. Standards for drinking water. Diseases associated with water supply.

(c) Garbage, refuse and excreta. Methods of collection, removal and disposal. Types of latrines and their uses. Utilisation of wastes, composting, sullage and sewage farming.

(d) Disposal of the dead.

(e) Principles of housing—Residential and Non-residential—Rural, Urban and Industrial.

(f) Disinfection—Disinfectants. Deodorants, Antiseptics, Germicides. Methods of disinfection and sterilisation.

(g) Insects—Insecticides and Disinfection—Insects in relation to disease. Insect control.

(h) Protozoal and helminthic diseases—Life cycle of protozoa and helminths; their prevention.

### *IV. Industrial Hygiene—*

(a) Health, Safety and Welfare of industrial workers. Industrial Hazards.

(b) Occupational diseases.

(c) Offensive trades. Trade wastes and disposal.

(d) Noise, fatigue, rest and recreation.

**V. Medical Statistics—**

Principles and elements of Statistics.  
Vital Statistics.

**VI. Preventive Medicine—**

(a) Infection, resistance, immunity. General principles of prevention and control of communicable diseases. Their application and prevention of common infectious diseases specially of tropics.

(b) Natural History of diseases.

(c) Important communicable diseases, specially plague, cholera, small-pox, diphtheria, tuberculosis, malaria, kala-azar, filariasis, typhus, rabies, leprosy, venereal diseases, common virus diseases, e.g., common cold, measles, chicken-pox, poliomyelitis, infective hepatitis, helminthic infections, enteric fever and dysenteries; also animal diseases transmissible to man. Their description and methods of prevention. Spread by contact, by droplet infection, by environmental vehicles (water, soil, food, insects, animals, fomites, etc.).

**VII. Maternal and Child Health.****VIII. School Hygiene—**

Medical inspection and correction of defects. Control of communicable diseases in schools.

**IX. Mental Hygiene—**

Elementary principles.

**X. Health Education—****XI. Public Health Administration—**

Brief history of development of Public Health, Central, Provincial, Local authorities. Notification of communicable diseases. Elements of Public Health laws applicable to India. The Social responsibility of the Physician in the diagnosis, treatment and rehabilitation of a patient.

**XII. Fairs, Festivals and Camp Sanitation.****XIII. International Health Relations—**

Sea ports and air ports quarantine. International health regulations—vaccination and inoculation of passengers, rat and vermin control. International Health Organisation.

**XIV. Traffic Sanitation—**

Railways, tramways, bus and other public conveyances.

**PRACTICAL**

(a) Field demonstrations should include visits to water purification plant, trenching ground, sewage, disposal works, incinerator, housing projects, urban, rural and industrial disinfecting stations, industrial plants, industrial bustees. Antimalaria operations, slaughter house, food markets, shop, etc.

(b) Attendance at maternity and child welfare centres, school, health clinics, chest clinics, V. D. clinics, infectious diseases, hospitals, institution for mentally defective, municipal health office, vaccination depot, rural health centres, voluntary organisations for social welfare work, etc.

N.B.—There should be an adequately equipped Hygiene Museum.

The course should be given by a course of lectures or lecture-demonstrations for 40 hours and 10 field-demonstrations for 10 hours and 5 clinico-social conferences.

**3rd-year**

1. Introduction to Preventive and Social Medicine.
2. Physiological Hygiene.
3. Environmental Sanitation.

4. Industrial Hygiene.
5. Medical Statistics.
6. Fairs, Festivals and Camp Sanitation.
7. Traffic Sanitation.

*4th-year*

1. Preventive Medicine.
2. Maternal and Child Health.
3. School Hygiene.
4. Mental Hygiene.
5. Health Education.
6. Public Health Administration.
7. International Health Relations.

## FORENSIC AND STATE MEDICINE

The course of study for this subject should be as follows :—

A. A course of systematic theoretical lectures not less than 30 covering the whole range of Forensic and State Medicine including Toxicology, Medico-legal aspects of Insanity, State Medicine as well as Medical Ethics and Laws.

This course should be taken in the 4th-year of medical studies.

B. Demonstrations—not less than 10 on wet and dry specimens, charts diagrams, toxicological specimens, drugs, weapons, X-Ray films, etc., of medico-legal interest.

C. Attendance at not less than 12 medico-legal post-mortem examinations including demonstrations and the writing of post-mortem reports for the same.

The detailed syllabus for the subject should include the following sections :—

- (1) Definition—Forensic Medicine and State Medicine.
- (2) Elementary knowledge of methods of investigation of criminal cases in India. Procedure of giving medical evidence in Courts of Justice with special reference to Indian Evidence Act.
- (3) Medical Certificates and medico-legal reports—Dying declaration and Dying depositions.
- (4) Methods of establishing identity of a living subject and of a dead body. Sexual characteristics of the skeleton. Mutilated bodies. Fragmentary remains.
- (5) Age—its medico-legal importance and methods of age-determination with special reference to eruption of teeth as well as radiological study of ossification centres for bones and bony union.
- (6) Death—its medico-legal aspects—Modes of death. Sudden death, its causes and medico-legal importance.  
Signs of death with special reference to cadaveric spasm. Rigor Mortis. Suggillation. Putrefaction. Adipocere and Mummification.
- (7) Medico-legal examination of a dead body—Procedure of holding autopsies in medico-legal cases.
- (8) Unnatural deaths and their recognition.
- (9) Medico-legal wounds—their classification and detailed study.
- (10) Elementary knowledge of examination of blood—chemical, microscopical, spectroscopical and biological examinations of blood stains.
- (11) Deaths by burns and scalds—Deaths from lightning, electric currents, heat and cold.
- (12) Starvation—its causes and medico-legal importance. Effects of X-Ray ultra-violet and infra-red rays' exposure. Post-mortem appearances in case of death.
- (13) Violent asphyxical deaths—Hanging, Strangulation including throttling, Suffocation and Drowning—Resuscitation of an apparently drowned person.

(14) Sexual crimes—Impotence and Sterility. Virginity and Defloration. Rape. Examination of seminal stains.

Medico-legal aspects of pregnancy—Development of foetus. Delivery signs of recent and remote delivery in the living and the dead.

Legitimacy and Inheritance.

Abortions—Infanticide—Unnatural sexual offences and Sex-perversions

(15) Medico-legal aspects of Insanity.

Procedure of examining a person alleged to be insane—lunacy certificates.

Different modes of placing lunatics under restraint. Feigned Insanity.

Illusion, Hallucination, Delusion and Obsession.

Criminal Responsibility.

Testamentary capacity—Lucid interval.

(16) Toxicology :

General considerations of poisoning and its classification.

Relationship of poisons and crimes.

Actions of poisons and factors modifying their action. Diagnosis of poisoning—Evidence of poisoning in the living and the dead.

Preservation of and despatch of viscera for chemical analysis.

Treatment of poisoning in general.

Toxicology of the following poisons to be studied :—

Corrosive mineral acids. Corrosive alkalies. Oxalic acid. Carbolic acid. Phosphorus. Arsenic. Corrosive sublimate and copper sulphate. Barium. Radium. Lead and antimony. Alcohol. Chloroform and Ether. Chloral Hydrate. Aspirin. Paraldehyde. Barbiturates and Opium. Datura. Belladonna. Cannabis Indica. Cocaine. Nux Vomica. Kerosene oil. Aconite. Nerium Odorum (White or pink oleander). Carbera Thevetia (Yellow oleander). Calotropis Procer and Gigantea (Hander or Akania). Plumbago. Zeylenica and Rosea (Chitra and Lalchitra). Castor seeds. Croton seeds. Jequitry (Rati). Samacarpus Anacardium (Bhela). Carbon Monoxide and Carbon Dioxide. Sulphuretted Hydrogen and Sewer gas. Snake bite, its effects and treatment. Scorpion bites. Potomaine poisoning.

(17) State Medicine.

Instructions on legal responsibilities and duties of medical men and on the generally recognised rules of Medical Ethics which may cover such matters as :—

(i) The responsibilities and duties of the medical practitioners to the State—Professional Secrecy and Privileged communication.

(ii) The responsibilities of practitioners to their patients.

(iii) The relationship of practitioners to one another.

(iv) Unprofessional conduct relating to advertising, canvassing, and to association with unqualified persons. Malpraxis—Civil and Criminal.

(v) The Covering of unqualified assistants, practitioners and midwives.

(vi) The duties of medical practitioners and the responsibilities of the Superintendent of a Hospital and his subordinate Medical Officers in cases of death under anaesthesia and after surgical operations.

(vii) The functions of State Medical Council and its relationship to Indian Medical Council.

(viii) A code of Medical Ethics as approved by the Indian Medical Council.

(ix) Attention should be called to all notices and instructions issued from time to time by the State Medical Council on Medical Ethics and Laws.

## MEDICINE INCLUDING THERAPEUTICS

A. A course of systematic instruction in the principles and practice of Medicine.

B. During the first three months of the clinical period when the students will not be in charge of beds they will be given instruction on elementary methods of Clinical Examination including physical signs, the use of common

instruments like Stethoscope, Ophthalmoscope, etc., and the examination of body fluids (with demonstration on living subjects—normal and abnormal). Recognition of common bacteria and parasites, their life-history and effects on the human system.

C. A medical clinical clerkship for a period of nine months (excluding the first three months as mentioned in B) of which six months must be spent in the hospital wards and three months in the out-patient department.

*Note.*—It is expected that each student will be given charge of five beds while doing clinical clerkship in the in-patient wards.

D. A clinical clerkship for two months in a children's ward or hospital (in-patient department for one month and out-patient department for one month).

E. During the period of medical ward-clerking for a period of one month it is expected that a student should work as an intern clerk when he or she should be in hospital or close by.

F. Lectures-demonstrations in clinical medicine and attendance in general in-patient and out-patient practice during at least two years which may run concurrently with the surgical practice under Surgery.

G. Instruction in Therapeutics and Prescribing.

H. Instruction in Applied Anatomy and Physiology throughout the period of clinical studies to be arranged between the teachers of Anatomy and Physiology and of the clinical subjects.

I. Instruction throughout the period of medical clerkship in Clinical Pathology, to be arranged between the teachers of Pathology and of the clinical subjects.

J. As a matter of convenience, it is suggested that instructions may be given in the following manner during the three years of clinical course in Medicine :—

#### *3rd-year*

Applied Anatomy and Applied Physiology.  
Diseases of the Respiratory System.  
Diseases of the Digestive System and Peritoneum.  
Diseases of Metabolism and Deficiency Diseases.  
Diseases of Blood, Spleen and Lymph Glands.  
Extra-Pulmonary Tuberculosis.  
Disorders of Endocrine System.  
Applied Therapeutics.

#### *4th-year*

Infectious Diseases.  
Pulmonary Tuberculosis.  
Diseases of the Cardio-Vascular System.  
Diseases of the Genitourinary System.  
Joint Disorders.  
Diseases of the Nervous System.  
Psychological Medicine.  
Tropical Diseases.  
Diseases of Skin including Leprosy.  
Diseases of Infants and Children.  
Applied Therapeutics.

#### *5th-year*

Applied Therapeutics.  
Applied Pathology.  
Radiology and Electrotherapeutics in their application to medicine.

*Note.*—(1) Throughout the whole period of the study the attention of the students should be directed by the teachers of this subject to the importance of its preventive aspects.



(2) Instruction in these branches of medicine should be directed to the attainment of sufficient knowledge to ensure familiarity with the commoner conditions, their recognition and treatment.

(3) Every student shall prepare and submit 20 complete case histories, ten being in the 3rd-year and ten in the 4th-year. These shall be considered in the Seminar Examination.

The written papers in the subject shall be distributed as follows :—

*Paper I*—Infectious Diseases. Disorders of Endocrine System. Diseases of Metabolism and Deficiency Diseases. Diseases of the Digestive System and Peritoneum. Affections of Joints and Peritoneum. Diseases of the Nervous System. Psychological Medicine. Common Diseases of the Skin.

*Paper II*—Diseases of Children. Diseases of the Cardio-Vascular System. Diseases of the Respiratory System. Tuberculosis. Diseases of Blood, Spleen and Lymph Glands. Tropical Diseases. Diseases of Genitourinary System.

## SURGERY

A. A course of systematic instruction in the principles and practice of Surgery.

B. During the first three months of the clinical period when the students will not be in charge of beds, they will be given instructions on fundamentals of Clinical Examination including physical signs, the use of common instruments, asepsis and antisepsis, dressing of wounds, etc. Study of common bacteria and parasites, their life-history and effects on the human system.

C. A Surgical Dressership in the Hospital Wards for a period of nine months (excluding the first three months as mentioned in Section B) of which six months must be spent in the hospital wards and three months in the out-patient department.

*Note.*—It is expected that each student will be given independent charge of five beds while doing Surgical Dressership in the Indoor wards.

D. During the period of Surgical Ward Dressings for a period of one month as an intern-clerk, during which the student is expected to be in residence in hospitals or close by.

E. Lecture-demonstrations in clinical surgery and attendance in general in-patient and out-patient practice during at least two years, which may run concurrently with the medical practice under Medicine (F).

F. Practical instruction in surgical methods including physiotherapy.

G. Practical instruction in minor operative surgery on the living.

H. Instruction in the administration of anaesthetics.

I. A course of instruction in Operative Surgery.

J. Instruction in Applied Anatomy and Physiology throughout the period of clinical studies to be arranged between the teachers of Anatomy and Physiology and of the clinical subjects.

K. Instruction throughout the periods of surgical dressership in Clinical Pathology to be arranged between the teachers of Pathology and of the clinical subjects.

L. Instruction in the following subjects :—

- (i) Radiology and electrotherapeutics in their application to surgery.
- (ii) Venereal diseases.
- (iii) Orthopaedics.
- (iv) Dental disease.
- (v) Surgical diseases of infancy and childhood.

M. As a matter of convenience, it is suggested that instructions may be given in the following manner during the three years of Clinical Course in Surgery :—

*3rd-year***A. General**

Applied Anatomy and Applied Physiology.

General Surgical Procedures.

Inflammation. Infection—non-specific Infections, specific Infections. Suppuration. Bacteriology of Surgical diseases. Immunity.

Injuries. Contusions. Wounds. Haemorrhage. Shock. Burns and Scalds. Tumours and Cysts. Injuries and diseases of the Skin and Subcutaneous tissues. Ulceration and Gangrene. Diseases of the Blood Vessels and Lymphatic System. Injuries of Bones. Injuries of Joints. Injuries of the Upper Limb. Injuries of the Pelvis and Lower Limb. Diseases and Tumours of Bone and Cartilage. Diseases of Joints. Clinical Manifestations of diseases of individual joints. Deformities of limbs. Amputation. Artificial Limbs. Injuries and diseases of Nerves, Muscles, Tendons, and Bursae.

B. Venereal diseases.

C. Dental surgery.

D. Lecture Demonstrations on Splints, Bandage and Instruments.

*4th-year***A. General**

Injuries and Diseases of the Scalp and Skull, Brain and its membranes, Face, Lips, Mouth, Jaws, Tongue, Salivary glands, Neck, Thyroid, Parathyroid and Thymus, Breast, Chest and Thoracic Viscera, Spine, Abdominal Parieties and Peritoneum, Stomach, Duodenum, Liver, Gall Bladder and Bile Ducts, Pancreas and Spleen, Intestines, Rectum and Anal Canal. Intestinal obstruction. Hernia. Injuries and Diseases of Kidney, Ureter, Bladder, Urethra and the Genitalia. Diseases of the Suprarenal and the Autonomic system.

**B. Otorhinolaryngology**

Knowledge of the commoner diseases and accidents of the Ear, Nose and Throat including tracheo-bronchial tree and oesophagus with a knowledge of Anatomy, Physiology, Pathology, treatment and simple operative measures.

**C. Ophthalmology**

Clinical Examination of the Eye—subjective and objective. Elementary Anatomy of the Eye, its appendages, and the orbit. Elementary Physiology of the eye. Common diseases of the Lids, Lacrimal apparatus, Conjunctive, Cornea, Sclera, Iris, Ciliary Body, and Lens. Glaucoma. Orbital Cellulitis, Exophthalmos. Endophthalmitis, Panophthalmitis. Common diseases of the Retina and the Optic Nerve, associated with general conditions. Injuries of Eye lids and Eye ball. Elementary refraction of the eye. Squint. Use of Ophthalmoscope. Common operations on the eye and its appendages.

D. Lecture Demonstration on X-Ray and Pathological specimens.

*5th-year***A. Operative Surgery.****B. Anaesthesiology.****C—Radiology.****D. Electro-Therapeutics.****E. Surgical diseases of infancy and childhood.**

*Note.*—(1) Throughout the whole period of the study the attention of the students should be directed by the teachers of this subject to the importance of its preventive aspects.

(2) Instruction in these branches of Medicine should be directed to the attainment of sufficient knowledge to ensure familiarity with the commoner conditions, their recognition and treatment.

(3) Every student shall prepare and submit 20 complete case histories, ten being in the 3rd-year and ten in the 4th-year. These shall be considered in the seminar examination.

The written papers in the subject (except Otorhinolaryngology and Ophthalmology) shall be distributed as follows :—

#### FIRST PAPER

##### *General Surgery—*

Inflammation. Specific and non-specific infections. Haemorrhage, Shock. Burns, Ulcer and Gangrene. Tumours and Cysts. Injuries and Diseases of Nerves, Muscles, Tendons and Bursae. Diseases of Lymph—Vascular System including spleen.

Head and Neck Surgery including Surgery of Thyroid, Breast and Congenital anomalies.

Abdominal Surgery including Gastrointestinal system.

#### SECOND PAPER

Bone and Joint surgery. Injuries and Diseases of Spine. Deformities of limbs. Amputation and artificial limb.

Thoracic Surgery.

Genito-urinary Surgery.

#### OBSTETRICS AND GYNAECOLOGY AND INFANT HYGIENE

A. A course of systematic instruction in the principles and practice of Obstetrics and Gynaecology and Infant Hygiene, including the applied anatomy and physiology of pregnancy and labour.

B. Lectures and Demonstrations in Clinical Obstetrics, Gynaecology, and Infant Hygiene and attendance on the practice of a maternity hospital or the maternity wards of a general hospital including (a) ante-natal care and (b) the management of the puerperium, and on in-patient and out-patient gynaecological practice for a period of at least three months.

This period should be devoted exclusively to instruction in these subjects, and should be subsequent to the medical clinical clerkship and the surgical dressership. Not less than two-thirds of the hours of clinical instruction should be given to Midwifery, including ante-natal care and Infant Hygiene.

C. Of this period of clinical instruction not less than one month should be spent as a resident pupil either in a maternity hospital or in a hostel attached to a maternity hospital or to the maternity wards of a general hospital.

The students should, during this month, conduct at least twenty cases of labour under adequate supervision. Should the number of cases attended during this month be less than twenty, the remainder must be attended as soon as possible thereafter.

A certificate, showing the number of cases of labour attended by the student in the maternity hospital, shall be signed by a responsible Medical Officer on the staff of the hospital and should state—

(i) That the student has personally attended each case during the course of labour, making the necessary abdominal and other examinations under the supervision of the certifying officer who should describe his official position.

(ii) That satisfactory written histories of the cases attended, including, when possible, ante-natal and post-natal observations, were presented by the student and initialled by the supervising officer.

#### *4th-year*

*Obstetrics—*Applied Anatomy; Development of the Ovum. The Foetus and Appendages. Pregnancy—Normal Pregnancy. Pre-natal Care. Introduction to Abnormal Pregnancy. Labour—Normal Labour. Introduction to Abnormal Labour. Puerperium—Normal Puerperium. Post-natal Care.

**Gynaecology**—Applied Anatomy and Physiology; Gynaecological Examination. Developmental Anomalies of the Female Generative Organs; Sex Hormones; Disorders of Function: Menstrual Anomalies; Displacement.  
**Infant Hygiene**—Care of the New-Born.

*5th-year.*

**Obstetrics**—Pregnancy—Abnormal Pregnancy; Abortions; Molar Pregnancy; Extra-uterine Pregnancy; Diseases of Placenta and Membranes. Toxaemia of Pregnancy. Antepartum Haemorrhage. Disorders of Genital tract—Retroversion, Prolapse, Tumours, etc. Multiple Pregnancy. Protracted Gestation. Common Disorders associated with Pregnancy. Labour—Abnormal Labour. Abnormal Presentation and Position of Twins; Prolapse of the Cord and Limbs. Abnormalities in the action of the Uterus. Abnormal conditions of the soft parts. Contracted Pelvis. Obstructed Labour. Complications of the Third Stage of Labour. Injuries to Birth canal. Common Obstetrical Operations. Puerperium—Abnormal Puerperium. Infection. Other Common Disorders.

**Gynaecology**—Inflammation; Ulceration and Traumatic Lesions of the Female Generative Organs; New Growths; Common Gynaecological Operations and Radio-Therapy.

**Infant Hygiene**—Breast Feeding—Artificial feeding; Management of Prematurity; Asphyxia; Birth Injuries and Common disorders of the new born.

*Note.*—(1) Throughout the whole period of the study the attention of the students should be directed by the teachers of this subject to the importance of its preventive aspects.

(2) Instruction in this branch of Medicine should be directed to the attainment of sufficient knowledge to ensure familiarity with the commoner conditions, their recognition and treatment.

(3) Every student shall prepare and submit 20 complete case histories, ten being in the 4th-year and ten in the 5th-year. These shall be considered in the seminar examination—

The written papers in the subject shall be distributed as follows:—

Paper I—Obstetrics.

Paper II—Gynaecology and Infant Hygiene.

The new Regulations and syllabuses as printed above will come into force from the session 1957-58 for the new students who will be admitted for the first time in July, 1957. The Existing regulations will however, remain in force for the students who were admitted before July, 1957, until they pass the Examination.

## CHAPTER XLVI-D.

Anaesthesiology, Psychological Medicine and Genetics have been included in the list of subjects for the D.Phil. (Medical) degree.

## CHAPTERS LI & LII

The following changes in the Regulations relating to the institution of a Degree Course in Mining Engineering (B.E. Mining) and syllabuses thereof were made:

(1) That the degree course in Mining Engineering shall be called B.E. (Mining) Degree course.

(2) That it shall be a four year course in the same pattern as that of the other Engineering degree course of the Calcutta University.

(8) That the first two years of the course shall be common to all Engineering as per Chapter LI of the Calcutta University Regulations. The Mining students during their first- and second-year course shall be given one hour's lecture per week on their profession.

(4) That the third and fourth year course of Mining Engineering shall have the written and sessional examination papers and marks as detailed below :—

*Third Year Course*

(i) Mining (Paper I)	...	...	...
(ii) Mining (Paper II)	...	...	...
(iii) Mining Geology (Paper I)	...	...	...
(iv) Mine Surveying (Paper I)	...	...	...
(v) Metallurgy and Assaying	...	...	...
(vi) Hydraulics (half paper)	...	...	...
(vii) Physical Chemistry (half paper)	...	...	...
(viii) Electro Technology (paper)	...	...	...
(ix) Organic Chemistry, Fuels and Refractory (paper)	...	...	...
(x) Metallurgy and Assaying (sessional)	...	...	...
(xi) Electro-Technology (sessional)	...	...	...
(xii) Organic Chemistry, Fuels and Refractories (sessional)	...	...	...

*Third and Fourth Year Courses*

(i) Mining I (Paper I)	...	...	...	100 marks
(ii) Mining I (Paper II)	...	...	...	100 "
(iii) Mining Geology (Paper I)	...	...	...	100 "
(iv) Mine Surveying (Paper I)	...	...	...	100 "
(v) Metallurgy and Assaying	...	...	...	100 "
(vi) Hydraulics (half paper)	...	...	...	50 "
(vii) Physical Chemistry (half paper)	...	...	...	50 "
(viii) Electro Technology (paper)	...	...	...	100 "
(ix) Organic Chemistry, Fuels and Refractory (paper)	...	...	...	100 "
(x) Metallurgy and Assaying (sessional)	...	...	...	100 "
(xi) Electro-Technology (sessional)	...	...	...	50 "
(xii) Organic Chemistry, Fuels and Refractories (sessional)	...	...	...	100 "
(xiii) Mining II (Paper I)	...	...	...	100 "
(xiv) Mining II (Paper II)	...	...	...	100 "
(xv) Mining II (Paper III)	...	...	...	100 "
(xvi) Mining Geology (Paper II)	...	...	...	100 "
(xvii) Mine Surveying (Paper II)	...	...	...	100 "
(xviii) Coal and Mineral Dressing	...	...	...	100 "
(xix) Economics of Mining	...	...	...	100 "
(xx) Project and Thesis (sessional)	...	...	...	150 "
(xxi) Mining (sessional)	...	...	...	150 "
(xxii) Mining Geology (Sessional and Practical)	...	...	...	100 "
(xxiii) Mine Surveying (Sessional and Practical)	...	...	...	100 "
(xxiv) Mineral Dressing (sessional)	...	...	...	50 "
(xxv) Percentage mark of B.E., Part I	...	...	...	100 "
Total				2,400 marks

The maximum marks for B.E. (Mining) Part II shall be a total of 2,400.

(5) University Regulations in Chapters LI and LII should be amended as shown in Annexure I.

## ANNEXURE I

## ADDITIONS AND ALTERATIONS SUGGESTED TO

*Chapter LI*—Amend as follows :—After 'Part I', insert 'Mining' between the words "Electrical" and "and" inside brackets which states (Common to Civil, Mechanical, Electrical and Metallurgical courses).

Add—"Section 13 :—Minimum one hour's lecture per week on Profession in respective branches is to be given to the students during the two years' course."

*Chapter LII*—Section 2 : Add after (D) Metallurgical Engineering the following :—

(E) Mining Engineering.

Section 5—Add the following after '(d) Metallurgical Engineering' : -

(e) Mining Engineering—

(i) Mining (Paper I)	...	...	...
(ii) Mining (Paper II)	...	...	...
(iii) Mining Geology (Paper I)	...	...	...
(iv) Mine Surveying (Paper I)	...	...	...
(v) Metallurgy and Assaying	...	...	...
(vi) Hydraulic (half paper)	...	...	...
(vii) Physical Chemistry (half paper)	...	...	...
(viii) Electro Technology (paper)	...	...	...
(ix) Organic Chemistry, Fuels and Refractory (paper)	...	...	...
(x) Metallurgy and Assaying (Sessional)	...	...	...
(xi) Electro-Technology (sessional)	...	...	...
(xii) Organic Chemistry, Fuels and Refractories (sessional)	...	...	...

Section 13—After "(D) Metallurgical Engineering" add the following :—

(E) Mining Engineering—

(i) Mining (Paper I)	...	...	...	100 marks
(ii) Mining (Paper II)	...	...	...	100 "
(iii) Mining Geology (Paper I)	...	...	...	100 "
(iv) Mine Surveying (Paper I)	...	...	...	100 "
(v) Metallurgy and Assaying	...	...	...	100 "
(vi) Hydraulic (half paper)	...	...	...	50 "
(vii) Physical Chemistry (half paper)	...	...	...	50 "
(viii) Electro Technology (paper)	...	...	...	100 "
(ix) Organic Chemistry, Fuels and Refractory (paper)	...	...	...	100 "
(x) Metallurgy and Assaying (Sessional)	...	...	...	100 "
(xi) Electro-Technology (sessional)	...	...	...	50 "
(xii) Organic Chemistry, Fuels and Refractories (sessional)	...	...	...	100 "
(xiii) Mining (Paper I)	...	...	...	100 "
(xiv) Mining (Paper II)	...	...	...	100 "
(xv) Mining (Paper III)	...	...	...	100 "
(xvi) Mining Geology (Paper II)	...	...	...	100 "
(xvii) Mine Surveying (Paper II)	...	...	...	100 "
(xviii) Coal and Mineral Dressing	...	...	...	100 "
(xix) Economics of Mining	...	...	...	100 "
(xx) Project and Thesis (sessional)	...	...	...	150 "
(xxi) Mining (sessional)	...	...	...	150 "
(xxii) Mining Geology (Sessional and Practical)	...	...	...	100 "
(xxiii) Mine Surveying (Sessional and Practical)	...	...	...	100 "
(xxiv) Coal and Mineral Dressing (sessional)	...	...	...	50 "
(xxv) Percentage mark of B.E., Part	...	...	...	100 "

Total ... 2,400 marks

**Section 14**—After “D(xix) project and Thesis (sessional.....Metal-lurgical plant or Machinery” add the following :—  
(E) Mining Engineering.

(i)

## E (I) MINING (PART I)

### *Paper I*

**Principles and Practice of Coal Mining (Methods of Working)—**

**Boring**—Various methods, namely (a) percussive, with rods and ropes; (b) rotary, with diamonds and chilled shots. Lining of bore-holes, difficulties in boring, examination and preservation of cores, determination of dip, strike and thickness of beds from bore-hole records, siting of bore holes, survey of bore holes for position and deviation.

**Explosives**—Classification and composition; fuses and Detonators; Handling and storage precautions; charging and firing Misfire and Hang-fire; substitutes for Explosives; Costs.

**Shaft Sinking**—Selection of site, size number and shape of shafts; Ordinary methods of sinking inclined and vertical shafts; sinking in wet, weak and running grounds; surface arrangement; ventilation and lighting; Dealing with water; safety precautions; progress and costs.

**Supporting Excavations**—Classes for timber suitable for different conditions; Necessity and methods of preserving timbers; Application of timber, iron and steel, brickwork, masonry and concrete to the support of shafts, drives and working places; initial and maintenance costs.

**Methods of Working**—(a) Open cast—condition for its suitability and its limitations; stripping of overburden; development and maintenance of quarry faces; haulage and drainage in quarries; modern mechanised working of quarries and its costs. (b) Underground methods—consideration of general conditions for adopting different methods of working and their limitations. Details of Bord and Piller Method, Longwall Method and their Modifications. Use of coalcutting machines. Modern trend in mining methods.

**Subsidence and Stowing**—Theories of subsidence; Indian subsidence Committee Report; Dangers and losses due to subsidence; Different methods of stowing and their relative advantages.

## E (II) MINING (PART I)

### *Paper II*

**Principles and Practice of Coal Mining (Ventilation, Illumination, Inundation, etc.)—**

**Principles of Mine Ventilation**—Atmosphere and its composition; Necessity and standard of ventilation; pollution of mine air; properties, occurrence and detection of mine gases. Heat and humidity in a mine, their measurement and physiological effects. Methods of controlling temperature and humidity in deep mines. Legal requirements with respect to ventilation in mines.

**Natural Ventilation**—Influencing factors and their influence on ventilation of a mine with mechanical ventilation under different conditions.

**Mine Fans**—Designs, working and calculations; Fan characteristics and suitability; various types of centrifugal propeller and air-screw fans; Auxiliary fans underground.

**Ventilation Survey**—Use of instruments in measuring ventilating pressures and air quantities; coursing air current in mines; preparation of ventilation plans.

**Explosions in Mines**—Fire damp and coal dust explosions; detailed study of their behaviour, causes and preventive measures; investigations after explosion.

**Mine Fires**—Surface fires—causes and their prevention; underground fires—causes, detection and methods of dealing with them, and preventive measures.

**Mine Rescue and Recovery work**—Respirators, smoke helmet, self-contained breathing apparatus, Rescue stations, Fighting mine fires, Rescue and recovery work after an explosion or a mine fire. Coal Mines Rescue Rules.

**Inundation**—Causes, protective measures; approaching old workings.

**Mine Lighting**—Open lamps, candles, flame safety lamps, Electric safety lamps; storage, distribution, maintenance and examination of Safety Lamps.

## E (III) MINING GEOLOGY

### *Paper I*

**Introduction**—Geology—the science of the earth, its different branches and aim and scope of those branches. The earth as a planet, general idea about its origin, age, interior and surface features. The crust of the earth, its constituents.

**Physical Geology**—Moulding of the earth's surface due to operation of the different natural processes. Weathering, erosion, transportation and deposition. Preliminary ideas about the Geological work done by air, water, ice and life. Volcanoes and volcanism. Distribution of volcanoes.

**Structural Geology**—Common structural features of rock masses. Deposition and consolidation of sediments, stratification, bedding planes, current bedding, outcrop, true and apparent dip, strike, calculation of true and apparent dip, width of outcrops and thickness of beds. Folds of different kinds. Joints and faults and their varieties. Criteria for location of faults in the field. Unconformity and overlap.

**Earth Movements**—slow and rapid. Earthquakes, causes and effects, scale of intensity of earthquakes. Seismic belts. Mountains of different types, mountain building. Significance of folds, joints and faults in mining operations.

**Mineralogy**—Definition of a mineral. Crystalline and amorphous state. Crystals, different systems of crystals and the common minerals crystallising in those systems. Common physical, optical and chemical properties of minerals. Hardness, specific gravity, cleavage, fracture, lustre, streak of minerals. Polarisation of light. Double refraction and birefringence of minerals. Isotropism and anisotropism. Optic axis, uniaxial and biaxial minerals. Optic sign of minerals. Interference colour, extinction angles, twinning and refractive indices of minerals under the petrological microscope. Interference figures. Dispersion phenomena in minerals. Minerals as chemical bodies. Chemical characters of minerals. Isomorphism and Polymorphism in minerals. Mineral association and Paragenesis. Study of polished surface of ore minerals under the ore-microscope. Study of the chemical composition, physical properties, economic uses and Indian occurrences of the following minerals:—

Diamond, Graphite, Gold, Silver, Bauxite, Stibnite, Chromite, Chalcopyrite, Malachite, Azurite, Chalcocite, Bornite, Covellite, Haematite, Magnetite, Siderite, Limonite, Galena, Magnesite, Pyrolusite, Psilomelane,



Braunite, Cinnabar, Niccolite, Pyrrhotite, Pyrite, Cassiterite, Wolframite, Sphalerite, Smithsonite, Quartz, Kaolinite, Sillimanite, Kyanite, Corundum, Calcite, Dolomite, Gypsum, Barytes, Apatite, Feldspars, Pyroxenes, Amphiboles, Olivine, Muscovite, Biotite, Talc, Serpentine, Asbestos, Fluorite, Cryolite, Tourmaline, Garnet.

*Petrology*—Rocks as aggregates of minerals and as units forming the crust of the earth. The natural cycle of rock formation. The threefold subdivision of rock-kingdom. Igneous rocks, concordant and discordant igneous bodies, common forms of igneous rocks, i.e., dykes, sills, laccoliths, batholiths, lopoliths, stocks and bosses, volcanic plugs and lava flows. Common textures and structures of Igneous rocks. Classification of Igneous rocks. Brief description of the following igneous rocks :—Granite, Syenite, Gabbro, Dolerite, Peridotite, Basalt and Pegmatite, Sedimentary rocks, their mode of formation, classification and brief description of the following types :—Sandstone, Grit, Conglomerate, Breccia, Shale, Limestone, Coal and Laterite, Metamorphic rocks, a brief idea about the origin of such rocks, the different agents and processes of metamorphism. Common metamorphic structures. Description of the following rock types :—Gneiss, Schist, Slate, Marble, Quartzite and Phyllite.

*Palaeontology*—Modes of preservation of plant and animal remains as fossils and their value in historical geology.

*Stratigraphy*—Elementary principles of stratigraphy; sub-divisions of the geological time scale; general characteristics of the major geological sub-division of India. The important physiographic features of India and their relation to geological history.

## E (IV) MINE SURVEYING

### *Paper I*

*Exploratory Surveying*—Use of hand instruments, namely, Prismatic Compass, Brunton Compass, Abney Level and Aneroid Barometer.

*Traversing with Compass Mounted on Tripod*—Magnetic Declination and its variations. Surveying in the presence of iron or magnetic material.

*Theodolite*—Construction, use, and adjustments of the different types of transit theodolite.

*Traversing with the Theodolite*—Independent and Triangulation-supported traversing. Plotting by protractor and by rectangular co-ordinates. Adjustments of the closing error.

*Triangulation*—Measurement of base-lines; simple triangulation; satellite stations; the two-point and the three-point problems. Errors and their distribution.

*Levelling*—Use and adjustment of the dumpy level, and of the Y-level; levelling rods. Plotting of profiles. Precise levelling with special instruments and methods.

*Tacheometric Surveying*—Tacheometer or stadia theodolite; stadia rods; Contouring for roads, ditches, railways.

*Plane-tableing*—Simple and telescopic alidades with Beaman Stadia arc. Contouring with the Abney and other hand levels.

*Geographic Position*—Determination of latitude, longitude and azimuth.

*Measurement of Areas and Volumes*—Computations; use of planimeter computing scale, Measurements of excavations and embankments.

*Setting-out*—Roads, railways, buildings, shafts, machine foundation and property boundaries.

*Study of Errors*—Sources, classes, propagation and growth. Treatment of non-systematic errors by the method of least squares.

## E (V) METALLURGY AND ASSAYING

*Metallurgy*

Crystallisation of pure metals, solid solutions, eutectics, eutectoids and compounds from liquid and solid alloys.

Heating and cooling curves—different methods of plotting. Systematic study of various types of thermal equilibrium diagrams.

Hardening, tempering, annealing, normalising and case hardening of steel and microstructure consequent on these operations.

Recovery, Recrystallisation and grain growth. Aging—Thermal and strain aging. Plasticity of metals and alloys, hot and cold working. Some common methods of testing metals and alloys.

Underlying principles of measurement of temperature, Thermoelectric, electrical resistance radiation and optical pyrometers.

*Assay*

The necessity and importance of securing a representative sample for analysis, conditions on which this depends. Hand sampling and mechanical sampling, Common methods of sampling coal ores, metals, etc. Lectures will be given to explain the principles underlying the analysis prescribed for the Practical course.

## E (VI) HYDRAULICS

*(Paper)*

Hydro-statics : Fluid pressure at a point, pressure gauges, total pressure on flat and curved surfaces centre of pressure. Buoyancy, stability of floating bodies.

Hydraulic flow : Equation of continuity; Bernoulli's theorem; the momentum theorem; linear acceleration of a liquid in a tank.

Flow through small orifices, time of emptying a tank. Measurement of flow in closed conduits—venturimeter, orifice meter. Elementary theory of losses in pipes—simple practical applications.

Hydraulic Pumps—Centrifugal and Reciprocating Pump—their installation and efficiencies. Simple problems on delivery and suction.

## E (VII) PHYSICAL CHEMISTRY

*(Paper)*

*Structure of Matter*—Atomic theory; electronic configuration and metallic crystals; valence bonds—electrovalent, covalent and coordinate covalent bonds; hydrogen bond; metallic bond.

*Chemical Calculations*—Relation between mass, Volume, density and temperature of gases; molecular weight and percentage composition; effect of pressure and temperature on gaseous diffusion.

*Gas Laws*—Kinetic Theory of gases; critical phenomena, liquifaction of gases; vapour pressure; diffusion.

*Liquids and Solutions*—Boiling point; surface tension; solubility and solution; osmotic pressure and Vant Hoff's theory of solution—determination of molecular weight.

*Chemical Kinetics*—Laws of mass action and chemical equilibrium, equilibrium constants—determination of equilibrium constant.

*Phase Rule*—Components, phases and degrees of freedom; phase diagram; thermal analysis; solid solution and eutectics; one component and two component systems.

*Thermochemistry and Thermodynamics*—Laws of thermochemistry and their applications; first and second laws of thermodynamics; concepts of free energy, entropy, enthalpy and work function; applications of free energy and entropy concepts.

*Colloids*—Preparation, properties and stability.

*Electrochemistry*—Faraday's laws of electrolysis, theory of electrolytic dissociation; ionic conductivity; strong and weak electrolytes; activity and ionic strength; oxidation-reduction reactions; primary and secondary cells, hydrogen ion concentration and pH value; theory of indicators; determination of pH value.

## E (VIII) ELECTRO-TECHNOLOGY (PAPER)

*D. C. machines*—Armature windings—Lap and Wave, simple and complex; equalising rings. Detailed study of no load and load characteristics of generators and motors. Theory and construction of starters; different methods of speed control of motors. Parallel and series running of generators and motors. Testing—determination of losses, efficiency, temperature rise, insulation, etc. Balancers—static and rotary types.

*Alternating Current*—Comparison of single-phase and polyphase systems; measurement of power in poly-phase systems, solution of problems on circuits by mathematical and symbolic methods; balanced and unbalanced circuits.

Detailed study of alternators and transformers—E. M. F. equation; windings; determination of regulation and efficiency. Induction motors—rotating magnetic field; squirrel cage and slip-ring motors; circle diagram; methods of starting. Main working principles of synchronous motors, rotary converters and mercury arc rectifiers.

## E (IX) ORGANIC CHEMISTRY, FUELS AND REFRACTORIES

*Organic Chemistry*—Introduction to Organic Chemistry; simple aliphatic hydrocarbons, aldehydes, ketones, acids, esters and ethers; simple aromatic hydrocarbons and their derivatives—hydroxy, nitro, amino and halogen derivatives.

*Fuels*—Introduction to fuel technology.

*Solid Fuels*—Wood, peat, lignites, coal and coke; origin and formation of coal; nature and classification of coal; characteristics, distribution and reserves of coal with special reference to India; storage and transport of coal; washing of coal; spontaneous combustion; destructive distillation of coal at low and high temperatures; manufacture of metallurgical coke and recovery of by-products; fusibility and clinkering of coal ash; utilization of pulverised coal.

*Liquid Fuels*—Different kinds of liquid fuels. Petroleum Technology—occurrence, composition and constituents of petroleum; distillation of petroleum and products derived from it; cracking processes; motor fuel and its refining; knock, octane number and cetane number, lubricating oils—refining, chemistry and testing; coal tar and its distillation products; production of synthetic liquid fuels.

*Gaseous Fuels*—Producer gas, semi-producer gas, water gas, blast furnace gas, coal gas and natural gas; their manufacture, composition and calorific values; chemical reactions and thermal changes involved in their production.

*Mine Atmosphere*—Composition, physiological and explosive properties of mine gases; black damp, white damp, fire damp, stink damp, nitrous fumes, etc.; mechanism of combustion and explosion of mine gases; respiration and effects of oxygen.

**Calorimetry**—Types of calorimeters for estimating the calorific values of solids, liquid and gaseous fuels; Chemical calculations involved in fuel technology.

**Refractories**—Refractory materials: Nature of refractories; characteristic properties of refractories; classes of refractories.

**Acid Refractories**—Chemical composition; silica bricks; clay—the impurities in clays; manufacture of fire-clay bricks.

**Basic Refractories**—Magnesia; lime; dolomite; bauxite.

**Neutral Refractories**—Graphite; chromite; neutral refractories and furnace lining; protection of refractories.

**Testing of Refractories**—Study of expansion, contraction, specific heat, porosity, permeability, fusibility; resistance to compression; slagging test; impact test; abrasion test; spalling test.

**Refractory Kilns**—General Principles; laboratory kilns; periodic kilns; continuous compartment kilns; tunnel kilns.

**Uses of Refractories**—In the ferrous and non-ferrous metal industry; in the generation of power; in the glass and cement industry and in lime kiln; in gas production, paper mill and enamelling.

## E (X) METALLURGY AND ASSAYING (SESSIONAL AND PRACTICAL)

Complete analysis of common ferrous and non-ferrous alloys, ores, slags and fluxes, fireassay of some common metals.

## E (XI) ELECTRO-TECHNOLOGY (SESSIONAL)

1. Measurement of leakage current and insulation resistance of a poorly insulated cable.
2. Location of faults in an actual underground cable.
3. Study of a 3- $\phi$  (three-phase) unbalanced circuit containing R, L and C.
4. Study of a 3-wire D. C. distribution problems (both balanced and unbalanced) with the help of Rotary Balancers.
5. Study of A. C. motor starters (*viz.* (i) Direct-on push-button Type, (ii) Star-delta type, (iii) Auto-transformer, etc.
6. Calibration of A. C. House-service meter on 220 V., 1- $\phi$  A. C. supply with resistance load.
7. Measurement of power and power-factor of a 1- $\phi$  A. C. circuit by (i) 3-ammeter method and (ii) three voltmeter method.
8. Connection of a D. C. generator on to D. C. bus-bar supplying power and to transfer the load of the other m/c to this machine and to shut off the other machine.
9. Determination of speed torque (Mechanical characteristics) curve of a D. C. shunt motor.
10. Determination of Efficiency-Vs-load curve for a D. C. machine by (a) Swinburn's method. (b) Hopkinson's method.
11. Determination of different losses in a D. C. machine by "Separation" of loss method."
12. Load characteristics of a D. C. Generator with its field—  
(i) Separately excited (using shunt field).  
(ii) Shunt excitation (using shunt field).  
(iii) Series excitation (using shunt field).  
(iv) Compound-excitation (using both the fields).
13. No load and load characteristics of a 3-phase alternator.
14. Voltage, current and power relationships of converting machines *viz.* of (a) 1- Mercury arc (full wave) rectifier and (b) 1- rotary convert.

15. Power factor improvement of a 1- $\phi$  A. C. Induction motor by means of a condenser.

16. Different connections of transformers to study 3 phase to 1-phase connections.

17. Determination of voltage regulation of a 3-phase transformer from open-circuit and short-circuit tests.

18. No-load and rotor blocked tests of 3-phase.

(a) Squirrel cage induction motor

and (b) Slip ring induction motor.

to plot the circle diagrams and to study the motor performance from the circle diagram.

19. Ward-Leonard method of fine speed control of a D. C. motor.

20. Synchronizing of a 3- $\phi$  alternator on to the Bus-bar and transference of load from one machine to the other.

## E (XII) ORGANIC CHEMISTRY, FUELS AND REFRACTORIES (SESSIONAL)

Detection of elements of simple organic compounds.

Sampling of Coal, coke and coal dust in mines.

Proximate analysis of coal and coke.

Determination of caking index.

Ultimate analysis of coal-determination of nitrogen, sulphur and phosphorus.

Determination of Calorific values of solid, liquid and gaseous fuels.

Testing of lubricants—Viscosity and flash point.

Analysis of gaseous fuels.

## E (XIII) MINING (PART II)

### *Paper I*

#### *Principles and Practice of Metalliferous Mining*

*Mineral Deposits*—Types; lodes, beds, masses, alluvial deposits. Shape, extent, features, irregularities and disturbances.

*Prospecting*—Geological reconnaissance. Surface or manual prospecting; geophysical aids, value of old heaps, workings and records.

*Alluvial or placer Mining*—Ground sluicing; hydraulicking; pump hydraulicking; and dredging. Stripping methods, drift mining.

*Open pit Mining*—Hand-loading pits, with shaft, with incline, with rope way, with level traction. Pits with mechanical shovel, with drag excavators, with bucket excavators and locomotive traction.

*Mine Development*—Type, location, size and sinking of shafts, vertical, inclined and adit. Shaft station, pit bottom, winze, raise cross-cut, ore-pass. Methods of opening and working of stopes.

*Mining Methods*—Room and pillar; pillar and stall; bord and pillar longwall; back stoping; rill stoping; flat back stoping; sub-level stoping; underhand stoping; overhand stoping; breast stoping; top slicing, bottom slicing, sub-level caving, and block caving.

*Shot-hole Drilling*—Percussive drilling; hand tools and manual drilling; Rock drills, pneumatic and electric; modern drilling tools, shaping and sharpening tools; precautions against silicosis.

*Haulage*—Transport in stopes, chutes, sledges, conveyors, etc. Underground stations and ore-bins; trams and haulage; skips and cages; surface arrangement;

*Drainage*—Vertical distribution of underground water; drainage measures on surface and underground; Adits and water stoppings; precautions against irruption of water underground; pumps—main and auxiliary types. Sinking pumps and station pumps.

*Miscellaneous*—Ladders and travelling ways; organisation and management; Metalliferous Mines Regulations in India and abroad.

## E (XIV) MINING (PART II)

### *Paper II*

Power Supply at Mines and Mining Machinery (Mechanical).

*Boilers*—Different types. Care and management. Feed Water heaters, steam super-heaters, Economisers, use of condenser in a power plant, Efficiency of boilers. B. O. T. Regulations for boilers.

*Drainage*—Steam and compressed air pumps. Pulsometer, Reciprocating and centrifugal pumps. Calculation of pressure of water in pipes and behind daus on surface and underground, capacity and horse power of pumps.

*Haulage*—Tubs and mine cars; Gravity and animal haulage, best gradient for loaded and empty tubs; Ropes for haulage purposes, capping and splicing of ropes. Self-acting inclines, equipment, Description and working of different systems of rope haulages. Calculations relating to haulage by Locomotives, conveyors, shuttle cars, Aerial ropeway.

*Winding*—Equipment for vertical and inclined shafts; wooden, rail and rope guides. Ropes of different types; capping and splicing of ropes; examination and preservation of ropes. Methods of winding Drum, Koepe and other systems. Winding from different levels. Pit frames for vertical and inclined shafts. Calculation of sizes of steam winding engines, depth indicators, brakes, detaching hooks, overspeed and overwind preventors, slow banking and other safety devices. Cages—single and multiple decked. Signalling. Layout of pit head. Details of banking and screening equipment.

*Internal Combustion Engines*—Gas, petrol and Diesel Engines. Air cycles for internal combustion engines—Efficiency and other details of such engines. Difficulty of using such engines underground.

*Loaders and Conveyors*—Different types. Calculation of their capacities and power requirements. Capital and maintenance cost.

*Coal-cutters*—Different types. History of development. Trend of progress in their design and use. Modern coal fall machinery. Auxiliary machinery for coal face.

## E (XV) MINING (PART II)

### *Paper III*

Power Supply at Mines and Mining Machinery (Electrical)

*Power Factor Improvement*—Effect of low power Factors; Methods of improvement—relative merits; Economic limit of power factor; Improvement by using special apparatus.

*Transmission of Power in the alternating current system*—Three phase four-wire system. Calculation of current in the neutral. Line constants Resistance, Line inductance.

*Performance of short and moderately long Transmission System*—Single-phase system, three-phase system. Efficiency of transmission, line voltage regulation. Comparison between the overhead transmission and underground transmission systems.

*Line conductors and supporting structures*—Conductor materials, supporting structures—wood-poles, steel-poles, reinforced concrete poles, steel towers, Spacing of conductors, span length. Mechanical consideration of the Transmission Lines.

*Insulators*—Insulating materials; Testing of insulators.

*Underground Cables*—Materials used for cable constructions. Different types. Their construction. Methods of cable laying. Installation of shaft cables—methods of suspension. Calculation of cable sizes for mines.

*Generation*—Private generation Vs Public supply.

*Power-supply Economics*—Investment cost; operating cost; load-factor, Diversity-factor.

*Alternators*—Constructional features of alternator; advantages of rotating field magnets; Advantages of three-phase systems; Automatic voltage Regulators.

*Synchronous Motor*—Theory of action. Vector Diagram. Starting of synchronous motors.

*Induction Motor*—Slip-ring and squirrel cage motors. Methods of starting, star/delta starter. Power factor improvement.

*Potary Converter*—Current and voltage ratios. Method of starting and paralleling. Voltage regulation. Efficiency.

*Winder*—With Ward-Leonard control.

## E (XVI) MINING GEOLOGY (PAPER II)

*Petrology*—Igneous rocks as products of consolidation of magmas. Process of consolidation magmas. Entectic, solid solution and peritectic relation in magmas. Origin of igneous rocks. Assimilation and Differentiation. Sedimentary rocks as products of the celebrated natural cycle. Study of size and shape of grains in sediments and their implication. Study of heavy mineral content in sedimentary rocks and its importance. Coal and limestone as sedimentary rocks. Metamorphism and metamorphic rocks. Contact, thermal, regional (dynamo-thermal), cataclastic and plutonic metamorphisms. Their mechanisms and products. Important economic minerals associated with metamorphic, igneous and sedimentary rocks.

*Palaeontology*—Fossils and their association with coal and petroleum bearing horizons. Fossiliferous limestones. Common fossil forms associated with the coal beds and petroleum bearing horizons with special reference to India.

*Stratigraphy*—Study in some details, of the Archaean, Gondwana, and Tertiary periods, and of the Deccan traps, with particular reference to the deposits of economic minerals contained in them.

*Economic Geology*—Scope of the subject. Study in brief of the important processes of formation of economic mineral deposits in nature. Definition of ore and gangue minerals, ores, and tenor of ores. The different common forms and structures of ore bodies. Metallogenetic provinces and periods. The geological conditions governing the formation of peat and coal. In situ and drift theories. Origin and preservation of petroleum in rocks.

Study in some detail, of the important economic mineral deposits of India with particular reference to their mode of formation, structure, association, extent and mode of occurrence, and how they govern the method of mining to be applied. Surface indications of mineral deposits. Different methods of prospecting of mineral deposits.

Different methods of collection of samples in the field from coal-seams and economic mineral deposits.

*Engineering Geology*—Building stones and road metals and their important characteristics. Stability of hill slopes and of open cuts, inclines and drifts in mines.

## E (XVII) MINE SURVEYING (PART II)

*Surveying with Miners' Dial*—Use and adjustment of various types of Dials.

*The Mine Theodolite*—Transit Theodolite with or without additional interchangeable side and top telescope for steep sights. The effect of errors of instrumental adjustment on the accuracy of underground surveys in flat and steep workings respectively. Importance of the transiting of compensation method. Precision traversing for holing through hobs. The more expeditious traversing methods for routine and periodic surveys. Connection of the mine triangulation with the Geodetic triangulation.

*Correlation of underground and Surface surveys*—Plumb-wiring in one vertical shaft, and in two vertical shafts; traversing inclined shafts and various combinations. Correlation by precise magnetic methods using orientation lines to correct for variation of magnetic declination and instrument errors.

*Underground Setting-out*—Setting out a point having given co-ordinates giving and maintaining direction and gradients for inclined shafts, slopes, levels; consideration of the accuracy required for any given work; ranging curves for rope haulage roads; setting out vertical curves for shafts.

*Stope and Face Surveying*—Use of Miners' dial, hanging compass with hanging clinometer, and Locke level for surveying excavations. Tape triangulation, radiation, and traversing methods.

## E (XVIII) COAL AND MINERAL DRESSING

1. Definition, scope and limitations—Differences between mineral and ore, economic significance of dressing, properties of minerals and development of different dressing methods, recovery and ratio of concentration, present position of mineral dressing in India and its future potentialities.

2. Hand picking—The process and its mechanics, performances and economics.

3. Preliminary mineralogical and minerographic studies of minerals, liberation and severance, methods and determination.

4. Crushing and grinding—Primary breaking operation, breaking units, their performances and applications. Intermediate crushing by gyratory crusher, cone crusher, rolls and impact crusher, crushing efficiency, their relative merits.

Grinding—tumbling mills, ball mill, tube mill, rod mill, their operation and performances, reduction ratios, costs and capacities, machine limitations, closed and open circuit operations.

5. Sizing and classification—(a) Screening—objects, scale of screening, screen analysis, sizing curves, methods of screening and types of screens—revolving vibrating, screening efficiency, capacity and limitations.

(b) Classification—Laws of classification, wet and dry methods types of classifier—stationary, mechanical, centrifugal, hydraulic and cyclones.

(c) Gravity Separation—Free settling ratio, teeter column, jigging theory, Jigbeds and their actions, types of Jigs, their capacities, sink float-concentration criterion, densities of mineral classes, types of heavy liquid and heavy media separation, their scope and limitation, production and properties of heavy suspensions, spiral concentration and other slime recovery units, concentrating table-behaviour of minerals on riffled tables, vanners and tilting tables.

6. Flotation—Physico-chemical principles, chemistry of flotation reagents, steps in flotation—(a) Froth formation, formation of bubble mineral complex, (b) Collection-function of collector, anionic cationic and neutral



collectors, choice of collector, (c) modification-activation, depression, flocculation, dispersion, function of modifying agent and its choice, PH Control, (d) Conditioning of pulp and its density.

Bulk and differential flotation, flotation machines, their operation and economics with special reference to Indian practice.

7. Electrical concentration—Principles of electro-static and electro-magnetic separation, Electro-static and magnetic separators and their performances, Behaviour of minerals in electro-static and electro-magnetic separators under dry and wet conditions.

8. Miscellaneous concentration—Amalgamation, reduction roast) calcination.

9. Dewatering—Thickening, sedimentation, filtration and drying, filters and filter fabrics, vaccum filter, pressure filters, centrifuge and drying hearths.

10. Accessories to ore treatment plants—chute and launders, conveyors and elevators, pumps, feeders and distributors.

## E (XIX) ECONOMICS OF MINING

*The Mineral Industry*—Importance to the Community. Difference from other industries and resemblances. Mineral Reserves the basis of the Industry.

*Sampling and Ore Valuation*—Methods employed in different cases; precautions to be taken; calculation of average reef values and widths, of average stopping values and widths and of average milling values and widths; estimation of average tonnages and values in a mine, percentage sorted, percentage recovered, assay-plan factors, limits of payability. Independent sampling—procedure and precautions. Sampling Alluvial Deposits and Dumps.

*Accidents*—Classification of accidents; statistics to show man-hours lost and compensation paid, causes and prevention of accidents dealing with the injured and rescue work.

*Labour*—Cost of skilled and unskilled labour; arrangement and supervision of labour; health of workmen, diseases associated with mining work; housing and feeding of workmen; labour-saving appliances.

*Mine Accounts*—Principles of modern Book-keeping; Engagement and payment of workmen, conditions of service, books and forms connected with the engagement and payment of workmen, with the purchase and distribution of stores, and with the sale of product. Working analysis and summaries; analysis of costs; head office books and balance sheet; depreciation and amortisation.

*Legislation*—Main provisions of Mining Laws and Regulations.

*General*—Considerations affecting the value of mineral deposits the choice of methods and machinery; price of metals, nature of country; labour supply, location in relation to transport; water supply; fuel supply; working costs; examination of mining properties and preparation of reports; mineral statistics.

## E (XX) PROJECT THESIS

Planning and development of a modern mine or a Section layout either by Bord and Pillar or Longwall methods. Design and maintenance of mining machineries and equipments.

**Thesis on stowing, flow of liquids and sand : stowing by mechanical and pneumatic methods. Transportation by mechanical means or Hydraulic; Roof Control, Safety in Mines; or any other allied subject.**

### **E (XXI) MINING (SESSIONAL)**

**Utilisation of mining machinery for various mining purposes :—  
Sketching—**

### **E (XXII) MINING GEOLOGY (SESSIONAL AND PRACTICAL)**

1. Study of symmetry elements of the different crystal systems.
2. Interpretation of simple geological maps and drawing of sections.
3. The use of Clinometer Compass.
4. Working out, graphically and otherwise, of problems relating to dip strike, and thickness of beds and completion of outcrops on contour maps from given data.
5. Drawing of diagrams illustrating important geological structures and forms of igneous rocks.
6. Determination of Specific Gravity of minerals and rocks. Use of Jolly's, La-touche's and Walker's Balance.
7. Identification, in hand specimens, of the minerals given in the following list from a study of their physical properties :—

Diamond, Graphite, Bauxite, Stibnite, Chromite, Chalcopyrite, Malachite, Azurite, Chalcocite, Bornite, Haematite, Magnetite, Siderite, Limonite, Galena, Magnesite, Pyrolusite, Psilomelanem, Braunite, Cinnabar, Niccolite, Pyrrhotite, Pyrite, Cassiterite, Wolframite, Shpalerite, Smithsonite, Quartz, Kaolinite, Sillimanite, Kyanite, Corundum, Calcite, Dolomite, Gypsum, Barytes, Apatite, Feldspars, Pyroxenes, Amphiboles, Olivine, Muscovite, Biotite, Talc, Serpentine, Asbestos, Fluorite, Cryolite, Tourmaline, Garnet.

8. Identification, in hand specimens, of the rocks given in the following list from a study of their important characteristics :—

Granite, Syenite, Gabbro, Dolerite, Peridotite, Basalt, Pegmatite, Sandstone, Grit, Conglomerate, Breccia, Shale, Limestone, Peat, Lignite, Bituminous coal, Anthracite, Laterite, Gneiss, Schist, Slate, Marble, Quartzite and Phyllite.

9. The petrological microscope, study of its different parts with neat sketches.

10. Identification, under the petrological microscope, of the rock-forming minerals given in the following list :—

Quartz, Orthoclase, Plagioclase, Microcline, Muscovite, Biotite, Hornblende, Augite, Olivine, Apatite, Zircon, Sphene, Garnet, Kyanite, Sillimanite, Tourmaline.

11. Interpretation of geological maps of the different coal and metal bearing areas of India.

12. Calculation of reserves of coal and ores, from available data, working out, graphically or otherwise, of problems relating to faults of different kinds.

13. Identification, under the petrological microscope, of the rock types given in the following list :—

Granite, Syenite, Gabbro, Dolerite, Basalt, Pegmatite, Sandstone, Shale, Gneiss, Schist, Marble, Slate, Khondalite, Charnockite, Koderite and Gondite.

14. Identification of the following ore minerals, under the ore-microscope, from a study of their properties in reflected light :—

Galena, Pyrite, Chalcopyrite, Sphalerite, Psilomelane, Magnetite, Haematite and Pyrolusite.

15. Recognition, in hand specimens, of the following genera of fossils :—

Gangamopteris, Clossopteris, Vertebraria, Ptilophyllum, Nummulites, Alveolina, Monograptus, Zaphrentes, Calceola, Arca, Cardita, Productus, Spirifer, Turritella, Physa (Bullinus), Nautilus and Ceratities.

16. Mechanical analysis of loose sediments and sedimentary rocks by panning and in the medium of heavy liquids.

17. Determination of ore-minerals by physical and chemical tests.

18. Examination of coal under the microscope.

### FIELD WORK

During the Third-Year Class there should be excursions to places of geological interest. The students should study in the field the common principles of field Geology. They should study the mode of occurrence of the mineral deposit they have visited, on the surface as also in the Mine. They should present a record of their work in the field in the form of a report duly signed by the teacher who guided the work.

During the Fourth-Year Class the candidates must visit a coal mine and any one of the following :—

(1) A Mica Mine.

(2) A Metal Mine.

They should study the mode of occurrence of the deposit, calculate the reserves, interpret the possible mode of origin of the deposit, collect systematic samples, and should study the method of mining of the deposit and its relation to the mode of occurrence. Each student should present a record of his work in the form of a report duly signed by the teacher who guided the work.

### E (XXIII) MINE SURVEYING (SESSIONAL AND PRACTICAL)

Mining Camp—Surveying a part of a mine and preparing plans and sections.

### E (XXIV) COAL AND MINERAL DRESSING (SESSIONAL)

\* Experimental work on crushing, grinding, sieve analysis, zigs, tables, filtration, sedimentation from part of the course, classification, flotation, magnetic separation and coal preparation.

The above changes have taken effect from the examination of 1957.

### CHAPTER LV

The following change in rule 9 of Chapter LV (I.Mus.) of the Regulations was made :—

" That the following proviso be inserted at the end of rule 9 :—

' Provided that a candidate taking up subjects included under papers III & IV of rule 7 aforesaid, must obtain 80% of the marks in each of the language papers; "

The change has taken effect from the I.Mus. Examination of 1957.

## CHAPTER LVII

The following Regulations for the Diploma Course in Museology (Chapter LVII) were adopted :—

1. An examination for a Diploma in Museology shall be held in Calcutta annually at such time and at such places as the Syndicate shall determine, the dates and places to be notified in the Calendar.

2. Any Bachelor of Arts (B.A.) or Bachelor of Science (B.Sc.) or graduate of any of the professional or other courses of this or any other recognised University, may be admitted to this examination, provided that he has prosecuted for not less than two years a regular course of study in the subjects offered by him in the Diploma course organised and conducted by the University.

3. No candidate shall ordinarily be admitted to the examination unless he has produced the prescribed certificate of

(i) having attended in an approved institution a course of instruction of not less than 75% of lectures in the subjects offered,

and

(ii) having been engaged during a period of not less than 75% of the practical classes in acquiring a practical knowledge of the duties, routine, technical and special relating to Museum work under the supervision of proper authorities appointed and or approved by the Syndicate.

4. Each candidate for admission to examination shall send in his application to the Registrar with a certificate in the prescribed form and a fee of Rs. 100, at least three months before the date fixed for the examination.

5. Each candidate presenting for the examination shall be required to take up a special subject and submit a thesis on any Museum subject, done under the guidance of a teacher or such other person approved by the Syndicate. The subjects for the thesis shall be previously approved by the Syndicate.

6. Any graduate of this or any other recognised University, engaged in active Museum service for a continuous period of not less than three years in any recognised Museum in India or outside may be exempted from provision (3) of these regulations and permitted to appear for the examination as may be approved by the Syndicate on the recommendations of proper Museum authorities.

7. A candidate who fails to pass or present for the examination shall not be entitled to claim a refund of the fee. A candidate may be admitted to one or more subsequent examinations on payment of the prescribed fee, which shall be Rs. 100 for each examination.

8. A candidate obtaining 35% of the marks in the aggregate in written, practical and oral examinations, shall be deemed to have passed the examination, provided that he shall not have obtained in any subject, less than 25%. A candidate obtaining 60% and above shall be placed in the 1st Class, and 50% and above in 2nd Class respectively.

9. As soon as possible, after examination, the Syndicate shall publish a list of successful candidates arranged in order of merit. Each successful candidate shall be given a Diploma in the form prescribed in Appendix ..., and shall be entitled to use after his name the abbreviation Diploma. Museology (Cal.) to indicate that he has passed the examination.

10. Every candidate shall be examined in the following subjects :—

Part I—General (compulsory for all candidates).

**Part II—Optional (in any of the groups of the following offered by the candidate) :—**

- Group A { (a) Archaeology and History.  
(b) Arts and Crafts.  
(c) Anthropology.
- Group B { (d) Geology and Geography.  
(e) Zoology.  
(f) Botany.

11. The Syndicate shall have power to add or to modify from time to time the extent of the course to cover other subjects falling within the scope of Museum service.

12. The distribution of marks shall be,

300 for Part I General—three papers each 100 marks,

500 for Part II, Optional of which

300 for Theory and—three papers each 100 marks.

200 for Practical and

200 for Essay and Thesis, totalling 1000.

13. The limits of subjects for examination and study shall be as follows :—

#### **PART I—GENERAL**

1. Idea of Museum—Origin, history and classification of Museums—Comparative studies in Museums in India and abroad.

2. Methods and organisations in Museums of different categories, local Museums, Private Museums, Municipal Museums, Institutional Museums, Public Museums, *in situ* Museums, Industrial Museums, Travelling or Mobile Museums.

3. Principles of Education, with emphasis on Visual Education and General Methods of Visual Education.

4. History of Education; Museum and Education, Psychology of Education.

5. Museum and Recreation.

6. Special Museum for the children and the handicapped—organisation, servicing preparation of study groups for the blind and the handicapped, backward and defective children

7. Administration—Staff, Finance, Budgeting and Budgetary control based upon existing activities, and future plans of developments. Working hours.

8. Museum personnel. Types and duties—classification, compensation, salaries, pensions and gratuities.

9. Buildings and other constructions for Museum purposes.

(a) Materials and details of construction. Use and properties of stone, brick, tiles, cement, sand, timber, iron, etc.

(b) Constructions, elementary principles of architectural designing, lines and shapes forms, and simple designing.

(c) Knowledge of use of modern sanitary equipments, closets, basins, sinks, drinking fountains, electrical fittings, and basic principles of sanitation.

(d) Knowledge of development of Indian Architecture from the earliest to modern and parallelism outside.

(e) Relation of Buildings to surroundings—site, orientation, climate planning and selection of appropriate materials, urban and regional planning.

(f) Auditoriums, Recreation halls, Exhibition-Galleries Laboratories, Workshops, and study and research rooms—equipments and interior decorations.

10. Storage space, Care and Control, Safety Fumigation, etc.
11. Reference and consultation halls and Library requirements, for records, relics and documents.
12. Methods of acquisition of objects for Museum purposes. Out-door work, field excursions, collections and field work and excavations.
13. Conservation—detailed study of the latest Museum methods and techniques employed in different fields, and for different kinds of objects, and practical work connected with them.
14. Registration of Museum objects; compilation of records and catalogues.
15. Display—The exhibition halls, their nature and construction, interior construction of halls, adaptation of show-cases, innovations, general lighting of halls, interior lighting of show-cases, decorations, background, environment of particular objects on display.
16. Lighting and Ventilation—reflections, causes of reflections and methods of avoiding them, effects of strong lights on materials exhibited causes of bleaching of colours of objects, protection measures.
17. Labelling—materials used, the fabric and style, colour of background for labels, texture of the materials used for the base, texts of labels, their nature to suit the very wide range of visitors—space of labels inconspicuous labels, methods of effective labelling.
18. Preservation of Museum specimens—dry and liquid preservatives in spirit and other fluids—infiltration.
19. Care and maintenance of objects displayed and in storage restoration, renovation, substitution, destruction of Museum objects, stock-taking.
20. Repairs and cleaning of objects of Art, Archaeology Ethnology and Natural history.
21. Visitors—and to whom to cater serious, curious casual, abnormal, organised, technical and scientific.
22. Museum education—stimulating the recreational interests of visitors by
  - (i) special exhibitions
  - (ii) popular and semi-scientific lectures,
  - (iii) special discussions and symposia
  - (iv) organising special classes on selected subjects for selected groups of visitors,
  - (v) guide lectures, and conducted tours in the Museum galleries,
  - (vi) organising childrens' galleries,
  - (vii) organising temporary exhibitions of topical interest.
  - (viii) intra- and extra-mural educational activities in collaboration with learned societies, colleges, schools and other bodies,
  - (i) organising Mobile Museums, lending of Museum exhibits and specimens, packing, transport ;
23. Photography, general principles, indoor and out-door photography, photography of individual objects, group objects, sceneries and settings, Art-photography stills, movies—Black & white-color—slides and film strips. Repairing-cleaning-deluminification-storage-re-photographing.
24. Publications and Editing—articles on current Museum topics and affairs, preparation of bulletins, general draftmanship, Art of advertisement and lay out preparation of news items for press, precis writing, proof-reading.
25. Knowledge of teaching and technical aids in Museums educational service visual and audio-visual, and special methods for the visually handicapped.

26. General knowledge
27. Research Guidance and preparation of Thesis.
28. Related Museum Services :
  1. General Information ; talks, popular lectures
  2. Facilities for Luncheons, Canteen and other amenities.
  3. Sales of Post-Cards, reproductions, publications, catalogues models, plaster-casts, etc.
  4. Planetariums.

## PART—II

## ARCHAEOLOGY

1. Background of Indian History and Culture.
2. Detailed knowledge of Indian Archaeology and Iconography
3. Knowledge of Indian Sculpture under :
  1. Early Indian Sculpture Pre-historic and Chalcolithic, Pre-Mauryan and Mauryan—3 B. C.
  2. Early Indian Sunga —2 B. C.
  3. " " Gandhara—1 B. C. — 5 A.D.
  4. " " Andhra — 1-3 A.D.
  5. " " Kushan — 1-3 A.D.
  6. Early Gupta, Gupta, Post-Gupta—4-8 A.D.
  7. Early Mediaeval Sculptures and Paintings—7 A.D.-12 A.D.
  8. Late Mediaeval Sculptures and Painting—12-18 A.D.
  9. Modern—19-20 A.D.
4. Indian Epigraphy, types and evolution.
5. Pre historic Archaeology—pre-historic sites and characteristic features.
6. Paleolithic, Mesolithic, Neolithic and Chalcolithic implements and other finds.
7. Metal, Ivories, Wood, Terracottas, Potteries, Beads and other antiquities.
8. Numismatics, ancient and mediaeval.
9. Minor arts and crafts, Treasure troves.
10. History and development of Indian Architecture, ancient, mediaeval and modern.
11. Preservation of old manuscripts, Antiquities in field and in Museum.
12. General knowledge of latest methods of conservation and Museum techniques.
13. Field work, archaeological excavation and exploration.
14. Very brief knowledge of latest methods of determination of "Fakes" and "Forgery" by lens, microscopes Infra-red photography, Ultra-violet radiation, polarisation, X-rays, panoramic X-radiograms by using Radio-isotopes such as Radio-iridium or Radio-thulium, etc., Spectroscopy and spectrography, quantitative analysis by molecular structure, by X-ray diffraction methods, chemical tests, radiocarbon investigations, etc., Determination of age.

## ART AND CRAFTS

1. General principles of Art.
2. Principles of Indian Art.
3. Principles of Western and Oriental Art.
4. Principles and characteristics of Indian Paintings.
5. Evolution of Art, Indian and Foreign—Pre-historic ancient, classical, mediaeval.

6. Modern and abstract Art.
7. Frescoes and Murals.
8. Textiles—Silks and other fabrics, Embroideries, Brocades, etc.
9. Pottery, Terracottas, Wood-carvings, Ivory, Bronzes, Leather, Silver and Gold metal art Wares.
10. Illuminated manuscripts—palm leaf; paper; bark, etc.
11. Inlaid works, pith-works, lino-cuts, stencil-work, etc.
12. Industrial and Commercial Art.
13. Folk-art, "Pata", "Sara" Clay dolls and toys.
14. Preservation, restoration, repair and maintenance of Art objects, paintings, manuscripts, textiles, etc.

### ANTHROPOLOGY

1. General outline of Anthropology and Ethnology of India.
2. General knowledge of Racial and Cultural history of India.
3. Comparative Anthropology and Ethnology.
4. General regional geography in so far as they determine human activities with reference to Anthropology.
5. Group life in various regions and environments and adaptations.
6. General knowledge of Pre-historic Archaeology, Paleolithic and Neolithic implements, etc.
7. Physical, social and cultural Anthropology.
  - (i) Comparative Anatomy of Primates, Human Paleontology, and evolution.
  - (ii) Primitive types, distribution in space and time.
  - (iii) Culture of primitive types.
  - (iv) Racial pre-history.
  - (v) Society-social customs and manners.
  - (vi) General principles of Human heredity.
8. Anthropometry and knowledge of the uses of the Instruments in Anthropometry such as Calipers, craniometers, pelvimeters, slide compass, metric tapes, Mollison's goniometer, colorimeter, etc.
9. Knowledge of implements and their method of use as for cultivation, hunting, fishing, weapons of war and chase, weapons of defence, etc.
10. Methods of transport and travel, and industries, and crafts of the people, as potteries, basketry, etc.
11. Habitations and dresses of people.
12. General knowledge of Blood-grouping.

### GEOLOGY

1. Evolution of the Earth, General Knowledge of the planetary system, Age of the Earth, isostasy and origin of continents and sea.
2. Crystallography, classification of Minerals.
3. Knowledge of Rock forming Minerals, varieties of Rocks, their genesis, structure, characteristics and distribution with special reference to India.
4. Ores, their mode of occurrence in space and time and their uses, exploration.
5. Paleontology and stratigraphy and organic evolution.
6. Distribution of minerals and ores in relation to Industrial activities, prospecting and development of economic mineral deposits.
7. Economic Geology—general knowledge of India.
8. General regional geography special region Asia.
9. Knowledge of Geological mapping, examination of minerals and rocks and ores and description of the same, preparations by sectioning, grinding and Microscopical and polarisation studies.



10. Applied aspects of Geology.
11. General Geology—Volcanoes, Earthquakes, Glaciers, River-basins. Oceanic beds, etc.
12. Paleo-botany.

### ZOOLOGY

1. General principles of Zoology, and History of Zoology.
2. Characteristics of living matter, and difference between the living and the non-living.
3. General morphology of cells, types of cells, cell divisions tissues and organs.
4. Evidence of theories of evolution.
5. Origin and distribution of animals in space and time, important animals, Horse, Elephant, Reptiles, Birds, etc
6. Classification and chief characteristics of each phylum, as Protozoa, Porifera, Coelenterata, Platy-helminthes, Nemothelminthes, Annelids, Echinoderms, Arthropoda Mollusca, Chordata.
7. Biometrics—Structure and life-history studies of selected Indian fauna, with reference to parasites, social insects, Fisheries, etc.
8. Histology, Embryology and genetics.
9. Dissections and Microscopic preparations, and micro-techniques.
10. Applied Zoology—Animal kingdom with special reference to Agriculture, Animal husbandry and Farm Management, system of breeding pedigrees and herds, Live-stocks (Cattle, Sheep, Goat, Poultry), Fisheries and knowledge of other aspects of economic zoology as Pearl Oyster Fisheries, Shank Fisheries, Cod and Shark Fisheries—their products and marketing
11. Microscopy, Microtomy, Photography and Photomicrography and principles of staining, mounting preparation of sections.
12. General regional geography.
13. The climate, weather type and distribution of animals.
14. Detailed knowledge of bones of animals, their articulations, muscular attachments, knowledge of skeleton system and Anatomy.
15. Entomology and Economic aspects.
16. Study of skins, skinning, mounting of birds and reptiles and other animals, Fishes and other groups.
17. Bleaching of Bones, loose and mounting of skeletons of various groups.
18. Half-body and whole and half-skeleton mounting techniques.
19. Habitat Groups—in special regions in India, Deserts, Himalaya Shore Fauna, etc.
20. Plaster cast mounts, moulds and finish.
21. Collection and preservation of various groups, insects, butterflies, snakes, lizards, birds and animals.
22. Wild life preservation.

### BOTANY AND AGRICULTURE

1. General principles of living and non-living. Phenomenon of life, difference between the vegetable and animal kingdom, general biology and evolution of organisms.
2. Plant cells, cell-inclusions and cell-divisions and plant tissues and their formation and functions.
3. Classification and taxonomy of plants, outlines of main systems.
4. Knowledge of Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms (Mono-cots and dicots), and Fossil-botany. Life histories and relationships and evolutionary tendencies.
5. Morphology and organography of plants.

6. Histology, anatomical features of the main groups of Cryptogams and Phanerogams.

7. Plant Physiology—general principles of assimilation, transpiration, respiration, reproduction, etc.

8. Agricultural economics and statistics—knowledge of crop husbandry, horticultural and Agricultural engineering, knowledge of tilling, manuring, weeding, irrigation etc., Agricultural crops, fodder and forage, fibre, pulses, oil, yielding plants, fruits and vegetables, etc.

9. General knowledge of Plant pathology.

10. General principles of cytology and plant breeding.

11. Evolution and heredity—Principles of genetics and Mendalism.

12. General regional geography, with particular reference to India and neighbourhood.

13. Plant geography, group life in various regions and environments and adaptations to environments, climate weather and soil conditions and their effects on natural vegetation, plant ecology, associations and communities classification of principal forest types, plant dispersal and distribution.

14. Economic Botany—Economic plants with reference to Agriculture, Horticulture, Forestry, Fibres, Medicinal, Forest products, major and minor, Oil Seeds and oil-yielding plants, Gums and resins, Dyes and tanning materials perfumery and cosmetics, raw products, matting and basketry materials, paper and paper-machine materials, raw products used in various other industries.

15. Microscopical and microtom studies of plants and plant materials, staining and micro-chemical plant techniques, photography and photomicrography.

16. Field collection, exploration of plant species, preservation, preparation of dried and fluid plant-specimens, Herbarium and Museum techniques.

The above regulations will take effect from the examination of 1953.

## APPENDIX F

### RESEARCH ACTIVITIES

#### ENGLISH

The Tuesday Seminar has continued, though it has suffered a little from frequent curtailment of the lecture time-table. The Seminar Committee organised a good series of lectures by speakers from outside, most of whom were teachers from Calcutta Colleges. There were also two debates, and an interesting talk by Mr. J. H. Stumpf, of the U.S.I.S., on "the English Department in a U.S.A. University."

In the 1955-56 session the Department had begun to raise funds for a Seminar Lending Library of its own, collected by subscriptions and donations from past and present students and from teachers. This year some books were purchased and the lending library was formally opened. It is still small, but the fact that the books are in constant circulation indicates that it supplies a felt need. The University has now granted a subsidy for the purchase of more books, which will undoubtedly increase the usefulness of the Seminar Library. We have also to thank the U.S.I.S. for a generous gift of six books on American Literature.

#### ECONOMICS

##### Books

The following books were published during the year :—

1. Prof. Saroj K. Basu ... Place and Problems of Small Industries.
2. Shri Amlankusum Datta ... Essays on Economic Development
3. Shri Alok Ghosh ... New Horizons in Planning

##### II Articles

Papers on different subjects were also contributed. Details are given below. Prof. Saroj K. Basu contributed three articles on "Currency and Credit during the Second Five Year Plan", Statesman, June, 1956. An article on 'Objectives of Central Banking Policy' also appeared in the Economic Affairs. He presided over the All India Commerce Conference in December, 1956. The presidential address was published in the Indian Journal of Economics.

Shri Amlan K. Datta published the following papers during the year under review :

1. The Pattern of Economic Growth Indian Journal of Economics, July, 1956
2. Innovations and Economic Progress Indian Economic Review, August, 1956
3. Welfare vs. Growth Economics ... Indian Journal of Economics, October, 1956
4. A Note on Co-operative Farming ... Economic Weekly, January, 1957

Shri Alok Ghosh contributed the following papers :—

1. The technique of Development planning for underdeveloped areas—Indian Economic Journal, December, 1956
2. A theory of Development Planning for Underdeveloped areas—Asian Studies, May, 1957.
3. Financial problems of small industries in an expanding economy—Economic Affairs, March-April, 1957.
4. The technique of Balances in Economic Planning—Economic Affairs, May-June, 1957.

Shri Santosh Bhattacharyya published a 'Note on Capital Intensity'—*Economic Affairs*, January, 1957.

Shri Kalipada Roy published a 'Note on the Asymptotic Distribution of Likelihood Ratio'—*Calcutta Statistical Association Bulletin*, March, 1956.

Shri Tarasankar Roy, Research Assistant to the Professor of Industrial Finance published an article entitled 'Some Thoughts on Deficit Finance and Inflation'—*Economic Affairs*, December, 1956. Shri Arunkumar Ghosh Research Assistant to the Professor of Industries published two articles:— (1) 'Stability and Fiscal Policy in Underdeveloped economy'—*Indian Journal of Economics*, October, 1956 and (2) 'Tax Structure and Expansion of Revenue', October, 1956.

### III. First Hand Investigation :

The year under review also witnessed the initiation of first hand investigation of selected economic problems of West Bengal by members of the teaching staff. Small funds were placed at their disposal by the University specifically for this purpose. Shri Alok Ghosh undertook an economic survey of small industries of Howrah with a view to analysing their financial credit and marketing problems. Tables and charts are under preparation from the Statistical data collected in the course of this survey, and the results of this enquiry will be shortly published.

Another first hand investigation for which financial aid was given was that relating to the "Nature and pattern of Rush Hour Passenger traffic within the city of Calcutta." Shri Santosh K. Bhattacharyya started this enquiry with the aid of about 25 students of the Department, who acted as Investigators during the last summer holidays. A report on the subject is under preparation.

Apart from the above enquiries financed by the University of Calcutta, considerable progress was made in regard to the Socio-Economic Survey of the city of Calcutta which is being financed by the Planning Commission. It will be recalled that this enquiry will be phased over a period of five years ending with June, 1959. A report was submitted during the year to the Planning Commission on the basis of Socio-Economic data collected during 1954-55. A survey of small scale business units in the city of Calcutta was also undertaken. Data relating to both small industrial units and selling units are being collected. These will be incorporated in the Report which will be submitted to the Research Programmes Committee (Planning Commission).

### IV. International Conference :—

In October, 1956 on the invitation of the FAO and the ECAFE of the UNO Dr. S. N. Sen, Reader in the Department of Economics attended an International Conference on Agricultural Credit held in Lahore. At this Conference as the Discussion Leader he initiated a debate on the "Role of Central Banks in the provision of Agricultural Credit." Dr. Sen's paper on the subject will be published by the FAO.

Prof. H. G. Johnson of the University of Manchester delivered a lecture to the students of the Department in September, 1956 on 'Problems relating to the theory of Balance of Payments.'

### POLITICAL SCIENCE

During the year under review the total number of students on the roll in the two M.A. Classes was 225. The total number would have been much larger if admissions had not been strictly restricted on a qualitative basis. Besides, there were some research students in the Department.

It is gladdening to note here that in the combined examination for recruitment to the I.A.S., I.F.S., etc., held in September, 1956, by the Union Public Service Commission, five of our former students have been reported to have done well.

Sri Subimalkumar Mukherjee attended the 19th session of the Indian Political Science Conference held at Waltair in December, 1956, and read a Paper there entitled "The Problem of Disarmament: Some of its Fundamental aspects."

The following papers were published by Prof. D. N. Banerjee during the period under review (1st June, 1956 to 31st May, 1957):—

Title of Paper	Where published
(1) "The Present Political System of India, with special reference to some of its Economic aspects."	"Zeitschrift Für Die Gesamte Staatwissenschaft," Tübingen, Germany. (The article was in English. The Editor of the journal had it translated into German. It was published in Germany early in 1957).
(2) "Some aspects of our Constitution—(IX) Fundamental Rights: Right to Freedom (continued)."	"The Modern Review," Calcutta; July, 1956
(3) "Some aspects of our Constitution—(X) Fundamental Rights: Right to Freedom (continued)."	"The Modern Review," January, 1957.
(4) "Some aspects of our Constitution—(XI) Fundamental Rights: Right to Freedom (continued)."	"The Modern Review," March, 1957.

Besides, Prof. D. N. Banerjee's "Report on the General Election in West Bengal, 1951-52," was published as a Chapter in the volume entitled "Reports on the Indian General Elections, 1951-52." This volume was published in December, 1956, by the Popular Book Depot, Bombay, under the auspices of the Indian Political Science Association.

## COMMERCE

An account of the research activities of Prof. S. K. Basu, Head of the Department of Commerce, will be found under the Department of Economics.

Sri Nirmalprakas De, a research student working under the supervision of Prof. S. K. Basu, submitted his thesis for the D.Phil. degree during the period entitled 'Trade Relations between India and France in the 18th Century.'

Sri Bishnupada Guha, a research scholar of the department, is preparing a thesis for the D.Phil. degree entitled 'Labour in the Coal Mining Industry' under the guidance of Dr. S. N. Sen, Department of Economics.

Dr. B. Dhar, a part-time Lecturer in the Department, published his work on 'Sterling Balance' during the period.

Sri S. C. Sengupta read a paper entitled 'Inflation Accounting' before the last Annual Commerce Conference in December, 1956. He also read another paper on 'Corporate Finance' in the last Chartered Accountants' Conference.

Sri Kalipada Roy, Lecturer in Statistics, published a note on 'Distribution of Likelihood Ratio' in the Calcutta Statistical Association Bulletin Vol. 7, No. 26, March 1957.

Sri J. M. Majumdar submitted several memoranda to the Damodar Valley Corporation and the Govt. of India including one on 'Economics of Inland Water Transport' with special reference to the future traffic potentiality of Durgapur Navigation Canal.

Sri M. L. Das published a paper on 'Banking Companies under the New Companies Act' in the University Commerce Magazine.

Dr. A. K. Dattagupta published a paper on 'Marginal Analysis and non-pecuniary considerations in the Indian Journal of Economics.'

## HISTORY

The University Centenary Volume contains five chapters written by teachers of this department—Beginning of Western Education (chapter I) by Dr. N. K. Sinha; Foundation of the University (Chapter II) by Dr. P. C. Gupta; Years of Consolidation, 1883-1904 (Chapter IV) by Dr. A. C. Banerjee; The University and Government, 1904-1924 (Chapter V) by Sri Tripurari Chakravarty; Recent Activities, 1924-56 (Chapter VIII) by Dr. Atindranath Bose.

Two papers written by Dr. S. P. Sen deserve particular notice. He has written on the effects on India of British Law and Administration in the 19th century for the UNESCO Sponsored Scientific and Cultural history of mankind. His paper on French historical writing on European activities in India was read at the London Conference of Historians in July 1956. Sri R. P. Dasgupta's work, A Comparative Study of Hindu and European Polity is in the press and is likely to be published in November. Volume XIII of Fortwilliam India House correspondence edited by Dr. P. C. Gupta is in the press. It will be published by the National Archives of India. Atindranath Bose is engaged in his work "History of Anarchist Thought."

A plan of research in economic history has been formulated. The Rockefeller foundation has promised to finance the project. But the Foundation will have no control over the project nor any responsibility for the result.

## ANCIENT INDIAN HISTORY AND CULTURE

The members of the Department were engaged in teaching and research activities during the last session. Some of them had rendered honorary service to a few other Universities of India at the request of their respective authorities. Prof. J. N. Banerjee, the Head of the Department, as a Member of the Boards of Ancient Indian History and Culture of the Universities of Banaras and Patna, attended the meetings of both the Boards and rendered useful service to them. He also attended the Annual meeting of the Central Advisory Board of Archaeology of the Government of India, in September, 1956 and took active part in its deliberations, as one of its members, and a member of its Standing Committee. He also attended the annual session of the Indian History Congress at Agra, in December, 1956 and read an original paper in its Section I. The revised and enlarged second edition of his 'Development of Hindu Iconography' was brought out by the University of Calcutta in August, 1956. An original paper of his was published in *Revue des Arts Asiatiques*, the mouthpiece of the Musée Guimet Paris during the year. He delivered two illustrated talks during the year, one in the Indian Museum and the other in the Asiatic Society. He also undertook in January, 1957, an archaeological tour in some parts of Orissa for collecting original materials for his studies.

Dr. B. C. Sen, Reader in the Department, was engaged in researches and rendered service to the Viswabharati University in an honorary capacity. He delivered a lecture on Gupta Coinage in the R. K. Mission Institute of Culture.

Sri S. K. Saraswati, another Reader in the Department, published (1) A Survey of Indian Sculpture and (2) Indian Architecture (A.D. 750-1,800) in the *History and Culture of the Indian People*, Vol. V, published by the Bharatiya Vidya Bhavan, Bombay. He prepared 'A Catalogue of Textiles in the Art Section of the Indian Museum, with a historical and critical introduction,' which has been approved for publication by the Board of Trustees of the Indian Museum, and which is ready for the Press. He prepared chapter on "Architecture in Bihar (Mughal Period)" for *Bihar through the Ages*, Vol. III (now in the Press). He delivered 5 illustrated lectures, two in the Indian Museum and three in the Asiatic Society. He read an original paper on 'Shamshuddin Ilyas Shah's Invasion of Nepal' in Section II of the Agra Session of the Indian History Congress, December, 1956. He undertook an

archaeological tour in Orissa for collection of materials for a history of Orissa architecture in January, 1957.

Dr. G. C. Raychudhuri, a part time teacher in the Department, read an original article in Section II of the Agra session of the Indian History Congress. His monograph on Early History of Mewar has just been published in the Journal of the Department of Letters Vol. I (New Series).

Sri N. N. Das Gupta's critical edition of "Krishna Maṅgala" is in the Press, and is shortly to be published.

Dr. S. R. Das read an original paper in Section I of the Agra session of the Indian History Congress. He sent an original article on 'Vrāta Culture' for publication in Sir Jadunath Sircar Volume being published by the East Punjab University. His monograph on 'Folk Ritual Drawing—Study in Origins' has just been published in Journal of the Department of Letters, Vol. I (New Series).

Sri Taponath Chakravarti, Tutor in the Department, has published his monograph on 'Some Aspects of Religious Life of Bengal of the mediaeval period' on the basis of literature and inscriptions in the Journal of the Department of Letters, Vol. I (New Series).

Sri Chakravarti, also published an article entitled "THE NARĀYANPUR IMAGE OF VĪṆĀYAKA (Dated the fourth regnal year of Mahipāla)" in the Gautama Buddha 25th. Centenary Special issue of the Indian Historical Quarterly Vol. XXXII, Nos. 2 and 3, June and September, 1956, which was published in December, 1956.

Another article written by the same writer has been accepted for publication by the Board of Editors of the East and West, a quarterly journal of the Italian Oriental Institute which is published and printed in Rome. The title of the aforesaid article is "Some Aspects of Religious Life as depicted in Early Inscriptions and Literature of Bengal".

He has also completed an article entitled "Some Information about Transport in Ancient Bengal", which will appear in a printed form in the Z.D.M.G., a well-known oriental journal published in Germany.

## PHILOSOPHY

S. C. Chatterjee :—(1) The Notion of Objectivity, (Proceeding of the Indian Phil. Congress, 1956).

(2) Sri Ramakrishna : His Life and Teachings (Proceedings of Union for the Study of Great Religions, Annual Conference, Madras December, 1956).

Rasvihary Das :—(1) What is Philosophy, (Presidential address at the 31st session of the Indian Philosophical Congress, December, 1956).

Papers published by Dr. J. N. Mohanty during the period June, 1956—May, 1957 :—

1. Nicolai Hartmann and A. N. Whitehead :

A study in Recent Platonism with a foreward by Prof. Hermann Wernicke of Göttingen.

(Progressive Publisher, March, 1957.)

2. "Thought and Action" (Paper contributed to the symposium in the Indian Philosophical Congress, Srinagar, 1957).

3. "A Recent Criticism of the Foundation of Nicolai Hartmann's Ontology", (Under publication in the Journal of the Department of Letters, Calcutta University, 1957).

Dr. Adharchandra Das :—

1. "Christianity and Fear" ... Published in the "Calcutta Review", October, 1956.
2. "Sri Ramakrishna and Wordly Life". Presented to the Second Conference of the Union for the Study of the great Religions, held in Madras during the Christmas week, 1956—Published in the "Calcutta Review", February, 1957.
3. "Sri Aurobindo and Some Modern problems" (book—200 pages). In the press—The General printers, Calcutta.
4. "A Modern Incarnation of God"—(A Commentary on the life and teaching of Sri Ramakrishna). Sent to George Allen & Unwin Co., Ltd., London for publication.

### SANSKRIT

#### I. Research work for the D.Phil. Degree

(Under Prof. Dr. Asutosh Sastri)

Name of the Researcher	Subject of Research
1. Jharna Bhattacharyya	... A Comparative study of Śaṅkara and Rāmānuja Vedānta.
2. Priti Mitra	... Philosophy of Sanskrit Drama
3. Sudha Ghosh	... Śrīkṛṣṇa in the Bhagabata
4. Taranikanta Bhattacharyya	... Philosophy of Bhāmatt.
5. Sita Sarkar (Rai Chandhuri)	... A study of Naiṣadhacarita
6. Chitra Ray	... Post-Śaṅkara Vedānta
7. Priti Sur	... A study on Kālidāsa.
8. Bimalkrisna Matilal	... A study on the Nyāyakusumāñjali of Udayana.
9. Narayan Goswami	... Nyāya Theory of Knowledge

(Under Pt. Narendrachandra Vedantatirtha)

1. Panchanan Bhattacharyya	... Anumāna theory of Sanskrit Poetics
2. Rabindrakumar Bhattacharyya	... Śabdātattva
3. Jimutavahan Bhattacharyya	... Sāṃkhya Theory of Creation
4. Priti Chanda	... The alaṅkāra School of Sanskrit Poetics
5. Mukundamadhav Sarma	... The Dhvani theory
6. Haripada Dutta	... The Status of the World in Advaita Vedānta.

(Under Sri Kunjagoviṇḍa Goswami)

1. Ramprasad Majumdar	... The Chronology of the Purāṇas
-----------------------	-----------------------------------

(Under Sri Kṛṣṇagopal Goswami)

1. Herambanāth Chatterjee	... A study of Smṛti and Mīmāṃsā
---------------------------	----------------------------------

#### II. Publication

1. Nyāyakusumāñjali, Part II, ed. by Pt. Narendrachandra Vedantatirtha (A.S.S. No. IV).
2. Nirukta translated into Bengali by Dr. Amarendra Thakur (A.S.S. No. V).
3. Śrautapāṭha (a Vedic Reader)
4. Darśanakośa vol. I on Sāṃkhya-yoga.



## III. Teaching

55 students enrolled in the 5th-year class, 30 students enrolled in the 6th-year class in Groups A, D, E, H, I and K.

## BENGALI

1. Sri S. B. Dasgupta—worked on the Bengali Buddhist songs and has published a book on Buddhism and the Carya-songs in Bengali. Also brought out an enlarged and revised edition of his book on the Similes of Kalidas.

2. Sri Pramathanath Bisi—(i) edited with a long introduction the best stories of Trailokyanath (ii) brought out an enlarged edition of the book entitled 'Rabindra-Vicitra,' a collection of essays on Rabindranath; (iii) edited with a long introduction 'Kavya-Vitāna'—an Anthology of Bengali poetry beginning with Chandidas down to the present time.

3. Sri Asutosh Bhattacharyya—The following papers were published in the course of the session 1956-57 :—

(i) Diffusion of Socio-Religious Festivities in North East India—published in the Cultural Heritage of India, Vol. IV. Published by the Ramkrishna Mission Institute of Culture, Calcutta.

(ii) Two Early Poets of Vidya-Sundar—Published in the "Bengali Literary Review, published by the Karaohi University.

(iii) বাংলা মৌলিক কথা-সাহিত্য—উত্তর হরী

(iv) রবীন্দ্রনাথ বাংলার লোক-সাহিত্য—উত্তর হরী

4. Dr. Bijanbehari Bhattacharyya—One book entitled সমীক্ষা containing a number of literary and philological articles was published during the last session.

5. Sri Taraknath Gangopadhyay—published the following two books during the session :—

(i) Sahitya-o-Sahityik (সাহিত্য ও সাহিত্যিক)—Collection of essays on various aspects of Bengali literature and literatures.

(ii) Sahitya chota galpa (সাহিত্যে ছোট গল্প)—A treatise on the fundamentals of short-stories in literature—its origin, development, form and variety, etc.—a comparative study of continental and Bengali short stories.

6. Sri Asitkrishna Banerjee—Published a book entitled ঊনবিংশ শতাব্দীর বাঙালী ও বাঙালী-সাহিত্য—The Cultural Background of Bengali literature from 1800 to 1833.

7. Sri Alokranjan Dasgupta—(Ramtanu Labiri Research Assistant)—has been working on the forms of Bengali literature.

8. Sri Prafulla Pal (keeper of Bengali manuscript)—(i) published a collection of songs by the Kaviwalas—published by the University of Calcutta

(i) Worked on Harivamsha Bhavananda.

A part from his work on "বাংলা সাহিত্যের ইতিহাস" which he has almost completed, he has worked upon the Vyapti-Vivaka of Mahima Bhatta an outstanding poetician of the 4th century—especially on his deviations from the traditional method of treatment.

## PALI

I. Prof. Nalinaksha Dutt took part in the International symposium held at New Delhi in November, 1956, on the occasion of the Buddha Jayanti, and delivered speeches (published by the Government of India on

(a) Message of Buddha;

(b) Contribution of Buddhism to Letters; and

(c) Buddhist Monasteries (under the auspices of the Lalit Kala Academy of New Delhi).

He delivered a lecture on "Contribution of Buddhism to Indian Culture" at the Annual Meeting of the Bihar Research Society held on the 14th January, 1957, at Patna (under the presidentship of Sri R. R. Diwakar, Governor of Bihar) to be published in the Journal of Bihar Research Society.

He served as a member of the following Selection Committees of different Universities :—

- (i) Delhi University—Selection of a Professor of Buddhistic Studies.
- (ii) Benares Hindu University—Selection of a Pali Lecturer.
- (iii) Visvabharati—Selection of a Tibetan Reader.

He acted as an Examiner of a Ph.D. Thesis of the Bihar University.

His works and papers published during the year under review are as follows :—

(a) Development of Buddhism in Uttar Pradesh in English and Hindi (published by the U. P. Govt.).

(b) Abhidharmakośavayākhyā (4th Kośasthāna).

(c) Mahāsannipāta Ratnaketusūtra (Gilgit Mss.).

(d) Survey of Important Books in Pali and Buddhist Sanskrit (Government of India, Vol. on "2500 years of Buddhism").

(e) Buddhism in Kashmir (Govt. of India Journal "Kashmir").

(f) Sammitiya School of Buddhism (Ceylon University Journal).

(g) Place of Buddhism in Indian Thought (Indian Historical Quarterly, December 1956).

(h) Tathāgatagarbha (Indian Historical Quarterly, March, 1957).

II. Dr. A. C. Banerji served as a member of the following Selection Committees.

(i) Darjeeling Government College (Public Service Commission—Selection of a Tibetan Lecturer.

(ii) Viśvabharati—Selection of a Reader in Tibetan.

He has published the following papers :—

(a) Principal Schools and Sects of Buddhism (Government of India Vol. on "2500 years of Buddhism").

(b) Abhidharmapiṭaka of the Sarvāstivāda School (Encyclopaedia of Buddhism, to be published by the Ceylon Government).

(c) Pratītyasamutpāda (Indian Historical Quarterly, December, 1956).

(d) Bauddha-dharmar Śāra-kathā (Jagajyoti).

III. Sri P. C. Mazumdar visited Ceylon and stayed there for one month for a first hand study of the Buddhist Culture and Archaeological Remains in Ceylon (Anurādhapura, Polonnaruwa and Dambulla Caves). He also examined the rare Pali Mss. in Ceylon monasteries.

He has made ready for the Press his edition of the "Maitreya Vyākaraṇa" and written some chapters of his thesis on "Mahāyāna Literature." His paper on "A few Chinese Travellers visiting India in the 13th/14th centuries" is being published in the Calcutta Review.

#### COMPARATIVE PHILOLOGY

Professor Sukumar Sen :

##### *Activities during the session 1956-57*

Participated in the Summer and Winter Schools of Linguistics held at Poona (May-June and October-November, 1956), held under the joint auspices of Rockefeller Foundation and Deccan College.

Engaged in dialectal survey of some regions in West Bengal and in the compilation of an Etymological Dictionary of Old and Middle Bengali.

Published the following :—

A. Books :

1. *Vicitra Sāhitya* vol. ii : a collection of linguistic and literary papers written in Bengali.

2. Rūparāma's *Dharmamaṅgala* vol. i : revised edition of an important Middle Bengali text, in collaboration with Sri Panchanan Mandal, M.A. and Sm. Sunanda Sen, M.A.

B. Papers in English :

1. An Iranian Trait in Indo-Aryan (*Indo Iranica* vol. x).

2. The Reciprocal Instrumental in Bengali (*Indian Linguistics* vol. xvii).

3. The Natha Cult (*Cultural Heritage of India* vol. iv).

4. Pali *Māraji* : Sanskrit *smaraṇit* (*Indian Historical Quarterly*, Buddha Celebration volume).

Research Scholars under guidance :

1. Sri Dayanand Srivastava, M.A., is working on the Syntax of Early Hindu Prose.

2. Sm. Sunanda Sen, M.A., is working on the Poetic Diction of Rabindranath Tagore.

3. Sri Sukumar Biswas, M.A. (up till April 1957), was working on the Arabic Affinities in Bengali.

#### ARABIC AND PERSIAN

(1) Dr. M. Z. Siddiqi :

(a) Saw through the Press his book "Studies in Arabic and Persian (Indian) Medical Literature" which is expected to be published in two months;

(b) translated into Urdu his book on "Special Features of Hadith Literature" the Arabic version of which was published several years ago.

Dr. M. Ishaque :

(a) Edited four issues of the *Indo-Iranica*, a quarterly bi-lingual (English-Persian), organ of the Iran Society published under the auspices of the Indian Council for Cultural Relations, New Delhi.

#### APPLIED MATHEMATICS

There are several groups of workers consisting of the College Staff, University and Government of India Research Scholars, and Professors of Undergraduate Colleges in the City, who are members of the Physico-Mathematical Colloquium in the Department of Applied Mathematics meeting every Tuesday, and carry on research work on a number of subjects such as the Statistical Theory of Turbulence, Dynamics of Fluids, General Theory of Relativity, Theory of Radiation, Hydromagnetics, Theory of Elasticity, and Problem of rigour in Mathematical Physics. They mostly work as a Research team guided by Prof. N. R. Sen, Dr. S. Ghosh and Prof. B. B. Sen. Some numbers work independently..

A Colloquium in which original papers in Fluid Mechanics and Mathematical Physics were discussed was held every Tuesday last year. A series of seminar lectures was arranged last year in which Sri P. K. Ghosh, Lecturer in the Department reported "on Functional Analysis (Hilbert Space, Spectral Analysis of Linear Operators in Hilbert Space)."

*Theory of Turbulence.*

In the Statistical Theory of turbulence the solutions of the integro-differential Heisenberg equation for decay of isotropic turbulence have been studied and stability of the corresponding motions have been investigated.

The solutions given by Heisenberg and Chandrasekhar appears to possess the highest degree of stability (Sen—Report of the First Congress of Theoretical and Applied Mechanics, Kharagpur, 1956, and further results communicated). K. M. Ghosh has investigated the general form of turbulence with localised axis of symmetry. Phenomena like jets are expected to produce this type of turbulence. Such turbulence shows no symmetry even upto the second order (under publication by the National Institute of Sciences of India). Further work in this line is in progress.

### *Fluid Dynamics.*

Theoretical work is being carried on by G. Debray (Professor of Mathematics, St Xavier's College, Calcutta), on blast waves. An exact analytic solution of the equations for an explosion with Spherical symmetry has been worked out. The explosion wave is headed by a shock and is supposed to possess a constant amount of energy (under publication by the National Institute of Sciences of India). Similar spherical waves of explosion, propagated under other different conditions, are being investigated and some more definite results have been obtained.

Motion of solids in inviscid rotating liquids has attracted considerable attention in recent times. D. D. Mullick (Ghosh Research Scholar) has been working on problems of rotating fluids. Barua's problem of secondary flow due to rotation of a stream flowing in a long circular tube under pressure has been reworked for flow in a tube with elliptic section. It is found that the symmetry of the circular section is not the determining factor in producing the secondary flow of the type discovered by Barua. The elliptic section does not alter the character of the flow (under publication by the National Institute of Sciences of India). The motion induced by vibration of a sphere along the axis of rotation of an infinite inviscid fluid, a problem analogous to Stewartson's problem of a sphere set in uniform motion by a stroke along the axis of rotation of an infinite liquid, has been studied by Mullick. The ultimate linearized motion has the feature of discontinuity observed in Stewartson's problem. The results obtained reduce to Stewartson's result in the limiting case. The problem of boundary layer for rotating viscous liquid is being studied at present by the same worker.

Various problem of Fluid Dynamics have been studied by other workers. S. R. Khamrai (Vidyasagar College, now Jadavpur University) has been interested in the motion of viscous liquids, such as flow in channels with circular arcs as cross section and motion with a steadily rotating sphere within (Bulletin Cal. Math. Soc. 48). Miss L. Sanyal has studied the motion of liquid issuing as jet through openings in a circular cylinder (Z. A. M. P. 8, 1956).

The problem of wave resistance of accelerated ships is being studied by R. N. Bhattacharyya (Formerly Professor, City College now Jadavpur University). The methods of replacing the ship by a distributed pressure, and by a distribution of moving surface of sources and sinks have both been used to solve the problem (partly under publication by the National Institute of Sciences of India). Further work in this line is in progress.

### *Astrophysics.*

K. K. Sen (Chandernagore College) has been working on the Radiative transfer of energy in Stellar atmospheres. His recent work published (Proc. Nat. Inst. Sc. Ind. A. 26, 337) deals with the transfer of radiation in an electron atmosphere, scattering according to Rayleigh's law. The atmosphere is taken as electron gas within two parallel planes and with the bottom coinciding with the photospherical level where the radiation is assumed to be unpolarised. Polarisation and Compton change of wave length in Scattering

upto the first order have been considered. Assuming monochromatic, and Gaussian distributions of intensity at the bottom, the emitted intensity at the bottom, the emitted intensity radiation at the surface as well as of its degree of polarisation have been calculated by the method of approximation given by Chandrasekhar.

Work on Hydromagnetics is being carried on by J. De (Government of India Research Scholar). De has established the possibility of existence of prolate spheroidal shapes of equilibrium for stellar bodies whose material behaves as infinitely conducting and in which straight currents parallel of the axis maintain a toroidal magnetic field. He has also examined the question of conservation of circulation round a circuit in a gaseous material in which there exists a magnetic field (Naturwissen Schoften, 256, 1957). Further work in Hydromagnetics is in progress.

#### *Rigour problem.*

The problem of rigour in Mathematical Physics has attracted the attention of Sri P. K. Ghosh (Lecturer in Applied Mathematics). His recent two papers on " —convergent Integrals" and "Mathematical foundation of Physically observable functions" (Bull Cal Math Soc. 48, 33; 49, 25) are in this line. Ghosh is at present interested in the application of Functional Analysis to problems of Applied Mathematics.

#### *Theory of Elasticity.*

Several investigators in this department are at present working on problems of anisotropic material. S. Ghosh (1) has recently shown that the torsion problem of a solid of revolution having curvilinear anisotropy can be made to depend on a single function analogous to that used in the solution of the corresponding problem of isotropic materials. J. Chakravorty (2, 3, 4) has discussed the problems of vibrations of transversely isotropic circular cylinder. He has also determined the distribution of stresses in a solid cylinder of transversely isotropic material and in a hollow anisotropic cylinder due to a band of pressure and a localised shear respectively. His latest contributions are those on the twisting of solids of spherically anisotropic material. The Problem of a hollow cylinder of transversely isotropic material with outer surface fixed and the inner surface acted on by twisting forces has been solved by P. Chatterji (5). Two-dimensional problem of an orthotropic plate with a nucleus of strain has been discussed by P. Choudhury (6). P. Choudhury (7) has also solved a problem of thermal stresses in a semi-infinite isotropic plate with periodic supply of heat on the straight boundary.

S. Das Gupta (8) who is engaged in researches on propagation of waves in layered media has written a paper on microseisms produced by the passage of storm over the deep sea. Disturbances of cylindrical and spherical origin propagated in different types of elastic media have been studied by S. Chakravorty (9).

B. B. Chatterji (10) has solved a few problems connected with determination of stresses in thin blades of different shapes rotating about axes in their planes

(1) Journal of Association of Applied Physicists, Vol. 3, pp. 1-4.

(2) Proceedings of the National Institute of Sciences of India Part A, Vol. 22, pp. 220-227.

(3) Bull. Cal. Math. Society, Vol. 48 pp. 163-176.

(4) Journal of Association of Applied Physicists, Vol. 3, pp. 14-16.

(5) Indian Journal of Theoretical Physics, Vol. 4, No. 2, pp. 61-66.

(6) Z.A.M.M. Bd. 36, p. 418.

(7) Journal of Association of Applied Physicists, Vol. 4, p. 1.

(8) Journal of the Physics of the Earth (Japan) Vol. 4, No. 2 (1956).

(9) Geofisica Pura and Applicata, Vol. 33, pp. 9-16, pp. 17-22. Vol. 35, pp. 25-32.

(10) Z.A.M.M. Bd. 36 (1956).

## PURE MATHEMATICS

In the Department of Mathematics, Prof. R. N. Sen, Mr. M. C. Chaki and Mr. H. Sen (research scholar) have been continuing their researches in Riemannian Geometry. Dr. H. M. Sen Gupta, Mr. P. L. Ganguli and Mr. B. K. Lahiri (research scholar) have been carrying on their researches in Real Variables. Dr. A. C. Chowdhury and Mr. S. Banerjee (research scholar) have been continuing their researches in Modern Algebra. Dr. M. Datta has been conducting researches in Statistical Mechanics and Theory of Numbers.

### *Published Works :*

1. Re-arrangements of series H. M. Sengupta.

Proc. Amer. Math. Soc., Vol. 7 (1956, June), pp. 347-350.

(Rearrangements of a conditionally convergent series of real terms induce a mapping of the space of positive integer sequences onto the Real number space. Some properties of this mapping is studied in the paper.

2. On a type of tensor in a Riemannian Space, by M. C. Chaki.

Proc. Nat. Inst. Sci. India Vol. 22, A No. 2, 1956, 59.

(In this paper it has been assumed that there exists in a Riemannian space  $V_1$  a tensor satisfying all the identities regarding indices of the Riemann Christoffel tensor except the cyclical identity. The properties of such tensor have been studied in  $V_2$ ,  $V_3$  and  $V_4$ ).

3. Some formulas in a Riemannian Space, by M. C. Chaki.

Ann. Scuola Norm. Super. Pisa, Serie III Vol. X, 1956, 85.

(In this paper a number of theorems and formulas involving two arbitrary affine connections in a Riemannian space have been established by imposing certain conditions on the affine connections).

4. Some theorems on recurrent and Ricci-recurrent spaces, by M. C. Chaki.

Rend. Sem. Mat. Univ. Padova, Vol. XXVI, 1956, 168.

(In this paper some necessary conditions for a Riemannian space to be conformal to a recurrent and to a Ricci-recurrent space have been given.

5. On new Partition of Numbers, by M. Datta.

Rend. Del. Sem. Math. della Univers. de Padova, Vol. 25, 1956, pp. 133.

(In this paper, after introducing new partition of numbers by restricting the repetitions of the parts, relations between these partitions and unrestricted partitions, and recurrence relations have been obtained. At the end, an asymptotic evaluation has been made by applying a Tauberian Theorem).

6. On the lattice of sub groups of finite groups by S. P. Bandyopadhyay.

Bull. Cal. Math. Soc., Vol. 48, No. 3, September, 1956.

(The lattices of subgroups of some well known groups have been determined. Complete relation between the lattice of subgroups of a group  $G$  and that of those of any of its factor groups has been established).

## STATISTICS

During the year under review Dr. P. K. Bose in collaboration with the research fellows carried on researches on (i) the construction of Statistical tables, (ii) Statistical methods in Psychometric research and Bio-Assay. A report on the Socio-Economic Survey conducted by the students of the Calcutta University was published.

Sri B. N. Ghosh continued his work on Large Scale Sample Surveys. He made special studies about the size, elongation and orientation of rectangular sample units used in areal sample surveys.

Dr. M. N. Ghosh continued his work in mathematical Statistics. He made a thorough investigation into the transport problems as envisaged in the Second Five Year Plan.

Sri H. K. Nandi has been studying a group of compound decision problems and a class of optimum decision procedures under certain simple loss functions has been obtained. Sri P. K. Bhattacharyya, who has been working under him, completed his thesis except for some numerical tabulations and published one paper on comparison of means of  $K$  Normal populations.

*List of Publication :*

Dr. P. K. Bose :

1. Normalisation of frequency functions (full paper)—Bulletin of the Calcutta Mathematical Society, Vol. 48 No 3, September, 1956.

2. Statistical Methods in Psychometric research—Presidential Address—Section of Statistics 44th Session of the Indian Science Congress Association, Calcutta, January, 1957.

3. Methods of matching used for the estimation of test reliability with Sri S. B. Chaudhuri, Sankhya, Vol 17, Part IV, February, 1957.

*Report :*

(1) Interim report on 'Studies of the Effectiveness of Board and University Examinations in India and Suggestions for their improvement'.

(2) The Role of University Students in Village Development work. Jointly with A. C. Chatterjee and T. C. Das.

SRI B. N. GHOSH :

(1) Optimum Structure of rectangular sample units, Calcutta Statistical Association Bulletin, Vol 6, No. 24, June, 1956

(2) A model for perimeter errors. Calcutta Statistical Association Bulletin, Vol. 6, No. 24, June, 1956.

(3) Enumerational errors in surveys, Calcutta Statistical Association Bulletin, Vol. 7, No. 26, March, 1957.

*Abstract :* In (1) the problem of determining the optimum size, elongation and orientation of rectangular sample units used in areal sample surveys or experiments has been investigated. In (2) the question of bias and changes of variance introduced by errors near the perimeter of rectangular sample-units used in crop-yield surveys or experiments has been studied with the help of a theoretical model. In (3) the problems of eliminating gross errors and controlling minor errors in enumeration work in surveys have been considered.

DR. K. C. SEAL :

(1) On minimum variance among certain linear functions of order statistics—Ann, Math. Stat, Vol. 27, September, 1956.

(2) Sums of covariances of order statistics from normal populations—Cal. Stat. Assoc. Bulln, Vol. 7, November, 1956.

(3) On a characterisation of gamma distributions—Cal. Stat. Assoc. Bulln., Vol. 7, March, 1956.

SRI P. K. BHATTACHARYYA :

(1) Comparison of means of  $K$  normal populations—Cal Stat. Assoc. Bulln., Vol. 7, November, 1956.

## CHEMISTRY

(a) A new type of complex compounds of Rhenium has been prepared and their constitutions are being studied. Trace elements such as Rhenium and Molybdenum in India Columbite, have been estimated. A method for the colorimetric estimation of Rhenium with Diphenyl Carbazide has been

developed. Attempts are being made to find out the transition temperature of the formation of Pseudo-alums at low temperatures. Many Pseudo-alums have not been isolated—probably due to lack of knowledge of their formation temperatures. Beryllium in Beryl has been estimated as Barium Fluoberyllate using Sodium Fluoborate as flux, composition of orange vanadate is being studied by physico-chemical methods.

Researches on the stability and electro-chemical properties of colloids are being carried out at present. More than six students are working under Prof. B. N. Ghosh, for their D.Phil., D.Sc. Degrees. Appreciative criticism of the researches which are being done in this laboratory have been received from several authors from abroad.

Research works in Synthetic Organic Chemistry are being carried out mainly in the steroid and terpenoid fields and polynuclear hydrocarbons

Activities on elucidation of the mechanism of ion-adsorption and ion-exchange are in progress. Preparation of ion-exchange resins with selective ion-adsorption properties, is being tried.

Investigation on the chemical composition of Indian Radio-active minerals and measurement of their Geological Time.

On the Polarographic estimation of some elements.

List of papers published :—

- (1) Beryllium Fluorides, part I, by A. K. Sengupta (J. Indian Chem. Soc., 33, 433, 1956).
- (2) On the quantitative estimation of Ferrous Oxide in Chromite, by N. Goswami (Science and Culture, 22, 338, 1957).
- (3) Electrokinetic measurement of the true zeta potential of Arsenious Sulphide sol in the region of slow coagulation, by B. N. Ghosh (Nature, 1956, 176, 1080-81).
- (4) Studies on the gelation of Silicic acid sols, Part III. Cationic and anionic effects on the time of gelation, by B. N. Ghosh (Jour. Ind. Chem. Soc., 33, 3, 56).
- (5) Studies on the gelation of Silicic acid sols, Part IV. On the development of yield value and structure of silicic acid salts. (Jour. Ind. Chem. Soc., 33, 6, 56).
- (6) Derivation of an expression for the evaluation of true zeta potential of two pores of different average diameters connected in series, by B. N. Ghosh (Naturwissenschaften, Heft 5, S104, 1956).
- (7) The Alkaloids of *Rauwolfia Beddomei* Hook. f. Part I—S. Bose, S. K. Talapatra and (Mrs.) A. Chatterjee—J. Ind. Chem. Soc., 33, 379 (1956).
- (8) On the Constitution of Serpinine, a minor Alkaloid of *Rauwolfia Serpentina* Benth., S. Bose—J. Ind. Chem. Soc., 33, 374 (1956).
- (9) On the Constitution of Kopsine the Alkaloid of *Kopsia albiflora* L. and *K. Fruticosa* A. D. C.—Anilkumar Bhattacharya, Science and Culture, 22, 120 (1956).
- (10) Chemistry of the Alkaloids of *Rauwolfia canescens* Linn—Indian Journal of Pharmacy, 28, 232-239 (1956).
- (11) Isolation of Ursolic acid from *Vinca rosea* Linn—S. Roy and A. Chatterjee—J. Ind. Chem. Soc., 34, 340 (1957).
- (12) Isolation of allo-imperatorin and  $\beta$ -sitosterol from the fruits of *Aegle marmelos* Correa—Sudhirkumar Saha and (Mrs.) Azima Chatterjee—J. Ind. Chem. Soc., 34, 228, (1957).
- (13)  $\beta$ -diketone complexes of Lanthanons—1, N. K. Dutt, and P. Bandyopadhyay (Science and Culture, 22, 690, 1957).



- (14) Diallyl dithiocarbamidohydrazine as an analytical reagent—N. K. Dutta (Science and Culture, 22, 635, 1957).
- (15) Do.....Science and Culture, 22, 239, 1956.
- (16) Do.....Ibid, 22, 344, 1956.
- (17) Do .....Ibid, 22, 283, 1956.
- (18) Further free electron calculation on oxidation reduction potential—Sadhan Basu Trans. Faraday Soc., 1 56, 52, 1176
- (19) Para-localisation energy and polarographic half-wave potential—Sadhan Basu and Rama Bhattacharya, J. Chem. Phys.
- (20) Treatment of aza-naphthalene by perturbation method—Sadhan Basu and (Miss) Rama Bhattacharya, Proc. Natl. Instt. Sci., 1957, 23.
- (21) Studies on mechanochemical systems, Part I, Sadhan Basu and Phauibhusan Roychaudhury, J. Coll. Sci., 1957, 12, 19.
- (22) Viscosity and Axial Ratio of cellulose ether esters—Sadhan Basu and Dilip K. Roychaudhury Macromolecular Chemie, 1957, May, issue.
- (23) VV Spectra of copper chelates of quinoline-8-carboxylic acid—Sadhan Basu and Kumarkrishna Chatterjee, Analy. Chem. Acta., 1957, March, issue.
- (24) Synthesis of Polycyclic compounds, Part I. A new Synthesis of Alkylphenanthrenes, by J. C. Bardhan and D. Nasipuri, J. C. S., 350, 1956.
- (25) Synthesis of Polycyclic compounds, Part II. The ring closure of  $\beta$ -carboxy Y-1 naphthylbutyric Acid, by J. C. Bardhan, D. Nasipuri and R. N. Adhya, J. C. S. 355, 1956.
- (26) Synthesis in the diterpene series, by D. Nasipuri and A. C. Chaudhuri, Science and Culture, 22, 117, 1956.
- (27) A New Synthesis of Preine, by D. Nasipuri, Chem. & Ind., 795, 1956.
- (28) Synthesis of 2'-1'-Naphtha-1 : 2-fluorene, by D. Nasipuri, Science & Culture, 22, 232, 1956.
- (29) Synthesis of 2 : 9-dimethylpicene by D. Nasipuri, Naturwiss, 43, 469, 1956.
- (30) A Synthesis of 2-Oxohydrophenanthrenes, by D. Nasipuri, Chem. & Ind., 1389, 1956.
- (31) A Synthesis of 1-oxo-and 1 : 11-Dioxooctahydrochrysene, by D. Nasipuri, A. C. Chaudhuri and J. Roy, Chem. & Ind., 422, 1957.
- (32) A Synthesis of 1 : 2 : 3 : 4 : 4a : 9 : 10 : 10a-octahydro-1 : 1 : 4a-trimethylphenanthrene, by D. Nasipuri, Chem. & Ind., 425, 1957.
- (33) On the Neutralisation Curves of Colloidal Acids, by S. L. Gupta, Sci. & Cult., 749, 21, 1956.
- (34) On the Analysis of the Neutralisation Curves of Colloidal Acids by S. L. Gupta, Sci. & Cult., 54, 22, 1956.
- (35) An Analysis of the Neutralisation Curves of the Colloidal Acids, Part I, by S. L. Gupta, J. Indian Chem. Soc., 587, 33, 1956.
- (36) On the Conductometric Titration Curves of the Colloidal Acids, by S. L. Gupta, Sci. & Cult., 181, 22, 1956.
- (37) On the Features of the Neutralisation Curves of the Colloidal Clay Acids, by S. L. Gupta, 232, 22, 1956.
- (38) On the Features of the Conductometric Titration Curves of the Colloidal Acids, by S. L. Gupta, Sci. & Cult., 401, 22, 1957.
- (39) An Analysis of the Neutralisation Curves of the Colloidal Acids, Part II, by S. L. Gupta, J. Indian Chem. Soc., 63, 81, 1957.

(40) On the Mechanism of Aggregation and Peptization of Colloidal Particles, by S. L. Gupta, Sci. & Cult., 512, 22, 1957.

(41) On the Varieties of the Neutralisation Curves of the Colloidal Clay Acids, by S. L. Gupta, Sci. & Cult., 571, 22, 1957.

(42) On the Analysis of the Neutralisation Curve of the Colloidal Resorcinol Formaldehyde Resin, by S. L. Gupta, Sci. & Cult., 685, 22, 1957.

### PHYSICS

Work of Nuclear Emulsion Technique and Scintillation Counters for investigation in Cosmic rays and of radioactivity and Rocks and minerals are progressing satisfactorily in the Department of Pure Physics. Plates have been prepared and developed successfully with the imported emulsion in gel form.

Work on soft X-ray Scattering and Solid state Physics is also continuing satisfactorily.

Researches are being carried out in the following lines :—

#### (a) Crystallography Section—

The analysis of the structure of the multicyclic organic compound by the Fourier synthesis method is being continued.

Preliminary crystal data of Nor-Harman has been accepted for publication in Acta Crystallography. A two-dimensional projection of density of electrons about the three principal planes has been completed and the final refinements are being made.

A scheme has been drawn up to determine the co-efficient of thermal expansion of metals and binary alloys from the X-ray diffraction data. Preliminary work with transition metal alloys has been completed and further work in this line are in progress.

#### (b) Soils and Clay-minerals—

In addition to routine X-ray and differential thermal analysis of Indian clay-minerals and soils, studies on the effects of removal of free oxides from soils collected from different districts of West Bengal have been made in collaboration with the Applied Chemistry Department.

Investigations on some Indian vermiculites have given interesting results, and further work in this line is being continued.

#### (c) Thermoluminescence—

The study of the thermoluminescence spectra of pure and activated alkali-halides by the rapid scanning spectro-photometer is being continued.

Thermoluminescence spectra pure PbCl, LiF, LiBr, NaI, etc. and impurity activated sample of NaCl, AgCl (0.5%), NaCl, AgCl (10%), NaCl : AgCl (20%), NaCl : CaCl<sub>2</sub>, NaCl : Be, etc. has been studied. Attempts are being made to correlate the results so obtained with the bleaching and charges in colour centres.

#### (d) Spectroscopy—

A programme has been drawn up to verify Hilsch and Pohl's ultra-violet absorption data of pure alkali-halides. Attempts are being made to correlate these data with the Photoconduction.

#### (e) Soft X-ray Spectroscopy—

A camera coupled with X-ray tube has been designed and constructed. The setting up of the apparatus as well as the calibration work is complete. The proposed work of studying the longer spacings in high polymers, proteins, hydrocarbons, etc. with soft X-rays will be shortly undertaken. A note entitled "A new experimental method for studying the X-ray diffraction has already been communicated to 'Nature' for publication.

The calibration work of the one metre bent crystal vacuum spectrograph is complete. In this apparatus, contrary to the conventional method, the X-ray tube is moveable while the crystal and the cassette is fixed within the chamber, all under the same condition of vacuum. Photographs have been obtained using hard as well as soft X-rays. A paper containing the details of the apparatus, method of study, results, etc. has been sent to the C.S.I.R. Journal for publication. Study of the valence band spectra of some insulators like are being studied by the reflection type ruled grating vacuum spectrograph.

### Published Papers

#### PHYSICS

1. Space-group and Unit-cell of Harmine.  
—Lilabati Ray.  
(*Zeitschrift für Kristallographie*, 20, February, 1957).
2. Optical and Magnetic Studies of Rauwolfia alkaloids.  
—S. B. Bhattacharyya and Lilabati Ray.  
(*Journal of American Optical Society*, February, 1957).
3.  $L_{\alpha}$ , and K-emission spectra of Mg, Al and Li in higher  
—A. K. Sen (*I. J. Phys.* 30, August, 1956).
4. On thermoluminescence Spectra.  
—B. C. Dutta & A. K. Ghosh (*I. J. Phys.* 30, November, 1956).

#### PHYSIOLOGY

(i) Indiscriminate use of Cincofen and its effects. By S. K. Mahalanobis, B. R. Roy and P. M. Sahachaudhuri. (*Ind. J. Physiol. and Allied Sci.*, 10, No. 3, p. 118, 1956).

Abstracts: Administration of Cincofen (in toxic doses) to albino rats, causes the following changes:—(1) Increased blood alkaline phosphatase activity. (2) Increased blood non-protein nitrogen. (3) Depressed glycogenesis in the liver. (4) Lowered blood sugar level. (5) Depressed rate of growth.

(ii) Biochemistry of guineapig semen. By P. B. Sen, A. Goswami and A. K. Chaudhuri. (*Ind. J. Physiology and Allied Science*, 10, No. 3, 1956, p. 138).

Abstracts: Whole guineapig semen was collected by electroejaculation and the total nitrogen, Ascorbic acid, and alkaline phosphatase were studied. The average value for nitrogen was found to vary between 8-12 per cent. The ascorbic acid value was found to vary between 4-8 per cent. in the whole semen. The acid phosphatase activity was found to be invariably lower than alkaline phosphatase activity because the major portion of guineapig semen is formed by the seminal vesicular secretion. The value for acid phosphatase was 6-13 units per 100 gm and that for alkaline phosphatase was 28-12 units per 100 gm.

(iii) A comparative study on the nutritional evaluation of different preheated oils—absorption of fats and their relation with the Utilization of Calcium. by D. Sinha, K. Mukherjee and P. B. Sen. (*Ind. J. Physiol and Allied Sci.*, 10, No. 4, 1956, p. 153).

Abstract—Sugar excreted in urine in skim milk fed rats has been partitioned for glucose and galactose. The amount of glucose is negligible and the sugar consists mostly of galactose. Blood sugar of lactose fed rats has been partitioned into glucose and galactose. There is a large amount of galactose in the blood of lactose fed rats with a depression of glucose level, although total amount of blood sugar is raised in comparison to that of the sucrose fed rats.

(iv) Hypothermia induced by cooling Blood in extracorporeal circuit, by S. R. Mukherjee, S. R. Maitra, P. K. Dey, A. Roy, A. K. Maiti, M. K. Roychowdhury, A. Chowdhury, with collaboration of P. B. Sen, N. N. Das, B. B. Sarkar. (*Ind. J. Physiol and Allied Sci.*, 10 No. 4, p. 185, 1956).

**Abstract**—An apparatus was devised to produce hypothermia by extracorporeal cooling of blood. When hypothermia was produced with the help of this apparatus it was observed that initial rate of cooling was relatively rapid. With lowering of body temperature there was a fall in the blood pressure and pulse rate became slower, but the blood sugar level was higher than the normal. Respiration became slower but not at an uniform rate. When the animals were rewarmed there was a rise in the blood pressure, respiration was normal, but the pulse rate was found to be slightly higher than the normal.

(v) Destruction of Vitamin A by Preheated Oils and fats some observations on hydrogenated oil. By K. Mukherjee and P. B. Sen. (Ind. J. Physiol. and Allied Sci., 10, No. 4, p. 193, 1956).

**Abstract**—(1) There is definite increase in the vitamin A—destroying power after heat treatments of fats. The rate of disappearance of vitamin A at the initial stage is relatively high. (2) duration and temperature of heating, exposure to light after addition of vitamin have influence on the rate of destruction. (3) The vitamin A destroying power of fats containing destroyed vitamin A is increased. (4) Both peroxide value and vitamin A—destroying power are enhanced during storage after heating but there is no absolute correlation between the two, which suggests other factors also taking part in the process. (5) Vitamin A—destroying power is also generated even when the fat samples are heated in the atmosphere of nitrogen.

(vi) Carbohydrate tolerance in hypothermia. By P. B. Sen, P. K. Dey, A. K. Maiti, A. Roy, A. Chowdhury, M. K. Roychowdhury, N. N. Das, B. B. Sarker, S. R. Maitra and S. R. Mukherjee (Ind. J. Physiol. and Allied Sci., 11, No. 1, p. 13, 1957).

**Abstract**—Sugar tolerance in Hypothermia induced by surface cooling as well as by extracorporeal cooling have been studied in detail. In the early stages of surface cooling, the rapid removal of the glucose from the limb cooled, indicates a fairly rapid utilisation of glucose by muscles. As the control limb did not show similar changes, the local causes seem to be responsible for initial high utilization of sugar. These have been discussed in detail. The changes in blood sugar level in Hypothermia when the extracorporeal technique was employed or in the later stages of surface cooling signify a generalised homeostatic disorder. The studies in the blood sugar tolerance curves before, during and after hypothermia justify the above statement. The possible causes of breakdown in the homeostatic mechanism have been discussed.

(vii) Hypothermia by cooling blood—Investigations in the suitability of preparations for Physiological Studies. (Ind. J. Physiol. and Allied Sci., 11, No. 2, p. 49, 1957). By S. R. Mukherjee, Bijon Roy, P. K. Dey, A. Roy, A. K. Maiti, S. R. Maitra, P. B. Sen, N. N. Das and B. B. Sarker.

**Abstract**—Description of a modified technique for studying the extracorporeal method of producing Hypothermia.

(viii) Variations de l'activité électrique du cerveau, du cœur et des muscles squelettiques au cours de la méditation et de l'extase yogique. (Variations of the electrical activity of the brain, heart and the skeletal muscles during the meditation and yogic ecstasy). By N. N. Das and H. Gastaut. (Published in *Electroencephalography and Clinical Neurophysiology*, Supplement No. 6, 1957 : Conditionnement et reactivité en électroencéphalographie.)

**Abstract**—S. S. Radhakrishnan defines as a—methodical effort to attain perfection through the control of the different physical and psychic elements of human nature; this control is obtained by techniques which concerns posture (asana), breathing (pranayama) or concentration of the mind. Concentration of the mind goes through three stages: dharana, or fixation of attention upon an idea or a mental picture (visual, acoustic or verbal); dhyana, or meditation proper; samadhi, or ecstasy during which the perfectly motionless subject is insensible to all that surrounds him and is conscious of nothing but

the subject of his meditation. Recording of E. E. G., E. K. G. and E. M. G. of seven subjects during these sacred exercises was done. The results are summarized as follows:—

No muscular electrical activity whatsoever appears during the hours of perfect immobility which the subject maintains.

The modifications of the cardiac rhythm are clear and almost perfectly parallel to those of the E. E. G. : definite acceleration during profound meditation and especially during ecstasy; a clear slowing down after the end of the ecstatic period.

The E. E. G. shows progressive and very spectacular modifications during the deepest meditation, in those subjects who have best training :

(a) Acceleration (13 c/s) of the alpha rhythm, decrease of the amplitude and appearance of faster (15, 20, 30 c/s) components.

(b) A beta rhythm of 18-20 c/s in the rolandic areas.

(c) A generalized fast activity of small amplitude which may reach 25-30 c/s and sometimes even 40-45 c/s.

(d) During the samadhi period, the generalized fast rhythms may be of higher amplitude, reaching 30 and 50 microvolts

(e) During and after meditation, the alpha rhythm reappears, often slower and more widely distributed at first (8 and even 7 c/s).

The evidence enables to conclude that yogi meditation, and the ecstasy to which it leads, represent a state of intense concentration of attention. One can even suppose that the electroencephalographic modifications found at the beginning of meditation or in poorly trained subjects, may correspond to those described in Europe and America during the deepest states of attention. On the other hand, the modifications recorded during very deep meditation and samadhi are much more dramatic than those known up till now, which leads us to suppose that western subjects are far from being able to attain the yogi state of mental concentration.

It is probable that this supreme concentration of attention on the sole subject of meditation is responsible for the perfect insensibility of the yogi during samadhi, this insensibility, accompanied by immobility and palor often led people to describe this state as sleep, lethargy, anesthesia or coma. The electroencephalographic evidence here described contradicts such opinions and suggests that a state of intense generalised cortical stimulation is sufficient to explain such states without having to invoke associated processes of diffuse or local inhibition.

(ix) Studies on electromyographic changes of muscles acting on the shoulder joint complex. By A. K. Saha, N. N. Das and B. G. Chakravarty (Calcutta Medical Journal, 53, p. 409-413, 1956).

**Abstract**—Systematic electromyographic studies have been made during elevation of the shoulder in abduction and flexion. Contraction of different muscles have been shown to be simultaneous though their power varies with the degree of elevation. Besides elevating the arm at gleno-humeral joint, muscles have been shown to give axial rotation and rolling at the gleno-humeral joint. The later action brings successively new contact areas at the gleno-humeral articular surface. During abduction this is brought about by latissimus dorsi in the earlier phase and by subscapularis, in the latter. During flexion subscapularis, pectoralis major and latissimus dorsi act in the similar way. Other movements of the accessory joints have been analysed, these include entero posterior rotation and vertical rotation of the scapula, forward migration and rotation of the clavicle in its axis, upward elevation of the girdle. Action of subclavius hitherto unrecognised has been analysed and found to aid rotation of the clavicle in its axis in the terminal phase of abduction and early phase of flexion overhead.

(x) Some histological and histochemical observations of the caprine forestomach. By S. L. Basu, Rekha Sen and A. Ghosh. (Ind. J. Physiol. and Allied Sci., 11 No. 1, p. 21, 1957.)

**Abstract**—The histological structure of the caprine forestomach has been studied. The points of difference in histoarchitecture of the three chambers have also been noted. Histochemical preparations of the rumen, reticulum and omasum were made to demonstrate connective tissues, alkaline phosphatase, metachromasia and aldose-containing substances. Fatty acids were conspicuous by their absence. It was of considerable interest that papillary connective tissue of the omasum displayed both metachromatic and PA-Schiff reactions. The possible significance of the various histochemical reactions in the caprine forestomach is briefly discussed.

(xi) Enhancement of oxidative phosphorylation of glucose by insulin. By G. Bhattacharyya. (Science, 123, 505, 1956).

**Abstract**—To study in vitro enhancement of oxidative phosphorylation by insulin in tissue homogenized liver and kidney of rabbit was used. In similar experiment dialyzed kidney extract was also used. There was a small but definite increase of oxidative phosphorylation of glucose by insulin. Insulin did not enhance the oxygen consumption.

### AGRICULTURAL BOTANY

Prof. P. K. Sen conducted researches on the following subjects with six Research Scholars and Research Assistants and three Research Students.

- (a) Effect of short day treatment on the induction of flowering in rice.
- (b) Inheritance of photo periodicity in rice.
- (c) Mineral nutrition of oil seed crops : Effect of N.P.K. in *Brassica* sp.
- (d) Effect of N.P.K. on growth and fibre in Jute.
- (e) Interaction of hormones, vitamins, amino acids and sugars on rooting of fruit tree cuttings.
- (f) Economics of small holding cultivation.

Publications by Prof. P. K. Sen and his students :

1. A regional survey on cost of paddy cultivation—Ind. Agri. Vol., I, pp. 5-12, 1957.
2. Effects of Nitrogen, Phosphorus and Potassium on growth yield and oil content of mustard (*Brassica juncea* Hook and Thoms). Ind. Agri., Vol. I, pp. 28-38, 1957.

Sri R. M. Datta carried on researches on the undermentioned subjects with the help of his students :—

- (a) Effect of different concentrations of different chemicals on the rate of pollen tube growth of some cucurbits.
- (b) Cytogenetical basis of incompatibility in two cultivated jute species *Corchoras Obtorius* (Linn. and *C. Capsularis* Linn.).

Publications by Shri R. M. Datta :

1. Observations on some abnormal leaves of *Aegle marmelos* Corr. (Fam. :—Rutaceae) —Sc. & Cult. 22 : 459-460, 1957.
2. Comparative studies on the rates of the pollen tube growth of the two cultivated jute species. (*C. olitorius* Linn. and *C. capsularis* Linn.) in vitro ;—Ind. Agri., Vol. I, pp. 39-44, 1957.

### BOTANY

In the Department of Botany researches on the following topics are being carried out by the members of the staff and research scholars : (a) Anatomy, (b) Embryology, (c) Plant Physiology, (d) Mycology and Plant Pathology, (e) Cytology and Cytochemistry, (f) Palaeobotany and Palynology.

Extensive work on the embryology and anatomy of several tropical plants has been carried out by Dr. I. Banerji and his students. Some of the significant results obtained during the year include shoot-apex organisation, comparative anatomy of aerial and underground roots and cytological studies of the plants belonging to Centrospermae, Asclepiadiaceae and Boraginaceae.

In the laboratory of Plant Physiology important contributions on the Physiology of rice plant have been made by Dr. S. M. Sircar and his associates. Investigations on the relation of auxin to growth and flowering; effects of nutrient deficiency on growth and metabolism of rice plant have yielded results of practical importance.

Work in the Mycology section includes the study of taxonomy, anatomy and cytology of higher fungi. A good progress of researches on the decay of felled timber caused by a number of fungi has been made during this year.

The laboratory of Cytogenetics and Cytochemistry under Dr. A. K. Sharma has made notable contribution on the cytological basis of speciation and differentiation. This section has also worked out a new technique for the study of chromosome chemistry and induction of division in permanent nuclei.

In Palaeobotany studies on microflora in coal, oil and peat have been carried out by Dr. J. Sen and his research works on organisation of supermicelles in anthracotes and coke have been well appreciated.

In addition, one Junior National Institute Research Fellow, Dr. T. M. Das, one National Research Fellow, Dr. Archana Sharma, one University Research Fellow and four Government of India Scientific Training Scholars have been carrying out researches on various problems in this Department.

#### Published Research Papers together with Abstracts

1. Life history of *Barbula indica* Bridel. By Dr. I. Banerji and Subir Sen. Proc. Nat. Inst. Sci. (Ind.), 1956. In press.

*Abst.*—Life history of *Barbula Indica* belonging to the family Pottiaceae has been studied in detail. This includes morphological, anatomical studies and regeneration of gametophore; spore germination development of sex organs, embryo and sporogonium. Meiosis shows presence of 15 bivalent chromosomes of which a pair is heteromorphic.

2. Embryological studies in *Daemia extensa* Br. By Indus Kumar Biswas, Senior Manpower Scholar, Government of India. J. Indian Bot. Soc., Vol. 36, No. 2, 1957.

*Abst.*—The development of pollen is of successive type. Meiosis is regular and reveals 11 bivalent chromosomes at metaphase I. The development of pollinia has been studied in detail and shows essential differences from those of the previous investigators. Pollen grains are trinucleate, ovules are unitegmic and tenuinucellate. Embryo sac is of polygonum type, endosperm cellular and embryo is of Linum variation of the Solanad type. Corma develops from the integumentary epidermis.

3. A note on the cytology and pollen in *Aegle marmelos*. By Dr. I. Banerji and Sunanda Pal, Senior Manpower Scholar, Government of India. PHYTON, Vol. 8, 1957.

*Abst.*—The somatic and meiotic chromosome numbers have been determined and the morphology of the former has been described. The size form and nature of the exine of the pollen grains has also been recorded.

4. Studies on the Physiology of Rice. X. Effects of Potassium deficiency on growth and Nitrogen metabolism of leaves. By S. M. Sircar and S. C. Datta. Ind. Jour. Agric. Sci., March, 1957.

*Abst.*—Potassium deficiency of rice plant in sand culture indicate certain characteristic symptoms developed in the leaves; tillering reduced and unfolding of leaves delayed. Under potassium deficiency nitrogen metabolism

of rice leaves is seriously affected ; protein synthesis is checked and accumulation of ammonia leading to early death of the leaves noticed.

5. Studies on the Physiology of Rice. XI. Vernalization and Devernalization of winter and summer varieties. By S. M. Sircar and Arati Roy, Proc. Nat. Inst. Sci. (Ind.) : 22, 1956.

*Abst.*—Experiments on vernalization and devernalization of rice varieties show that flowering of rice could be induced earlier by subnormal temperature of 12°C and the delaying effect of high temperature is annulled by subsequent exposure to low temperature.

6. Studies on the Physiology of Rice. XII. Culture of excised embryos in relation to endosperm auxin and other growth factors. S. M. Sircar and A. N. Lahiri. Proc. Nat. Inst. Sci. (Ind.) : 22, 1956.

*Abst.*—Attempts to culture rice embryo have shown that it fails to germinate when completely excised from the endosperm and placed in nutrient media. Its growth is dependent on endosperm food factors like auxins, vitamins, sucrose and mineral salts.

7. On the biology of *Auricularia auricula-Judae* (Linn.) Schroet. causing rot in Elder (*Sambucus nigra* L.). S. N. Banerjee. Proc. Nat. Inst. Sci. (Ind.), Vol. 22B, 1956.

*Abst.*—*Auricularia auricula-Judae* is undoubtedly responsible for the deterioration of large quantities of wood annually. Inoculation experiments of healthy standing trees of both *S. nigra* and *S. racemosa* carried out in the field have shown that the fungus in both cases can attack the living tissues through wounds in the bark. The fungus shows a preference to grow in the peripheral portion of the wood and in extreme cases cause severe heart rot.

8. Variation in *Polystictus xanthopus* Fr. S. N. Banerjee and Himani Devi (Roy). Ind. J. Mycol. Res., Vol. II, Nos. 1 and 2, 1956.

*Abst.*—This paper shows how much the species varies in regard to external form and anatomy of the fruiting bodies together with general cultural characteristics on artificial media. Attempts have also been made to find out the nature of antagonism and compatibility that exists between the mycelia of different forms, their rate of decay in wood and also their response to a toxic substance of different concentrations.

9. Contributions to the cytology of *Hymenomycetes*. II. Karyological observations in *Stereum fuscum* (Schard.) Quel. S. N. Banerjee and A. K. Mukherjee. Ind. J. Mycol. Res., Vol. II, Nos. 1 and 2, 1956.

*Abst.*—An investigation on the nuclear behaviour in the life cycle of *Stereum fuscum*, a very common species of Thelephoraceae occurring as a saprophytes on logs and posts of *Shorea robusta* in West Bengal during the wet months of July and September has shown that its karyological features are consistent with its sexually 'heterothallic' and 'bipolar' nature. The binucleate condition of hyphae comes to an end in the basidium in which the two nuclei fuse to form a fusion nucleus in which reticulate structures of chromatin material appear in the early stages of meiosis. The reticulum condenses greatly during the subsequent stages in which there appear chromosomes like structures and ultimately 8 chromosomes constituting the haploid complement aggregate into each of the two daughter nuclei formed at the poles of a transverse spindle. Two subsequent divisions in each of them eventually produce 8-daughter nuclei within the tetrasterigmatic basidium on which are developed 4-Basidiospores.

10. Studies on Heterothallism. II. *Polystictus xanthopus* Fr. S. N. Banerjee and K. R. Samadder. Sci. Cult., Vol. 22, 1957.

*Abst.*—The nature of sexuality exhibited by *Polystictus xanthopus* has been determined by making pairing experiments with 16 monosporous cultures.



It has been found that the fungus is 'heterothallic' and sexually 'tetrapolar.'

11. Fixation of plant chromosomes: its principles, limitations and recent developments. A. K. Sharma. Bot. Rev., 22 : 665-695, 1956.

*Abst.*—A complete review of different methods of fixation and staining schedules, with the scope of applicability of different ingredients and different fixatives has been made. The earlier methods of pretreatment and recent advances and the mode of action have been discussed. Further scope of investigation has been given.

12. Veratrine—its use in cytochemistry. A. K. Sharma and S. K. Sarker. Caryologia, 8 : 240-249, 1956.

*Abst.*—The effect of Veratrine on somatic chromosomes have been studied and three aspects of its behaviour, namely, polyploidizing capacity, capacity for karyotype analysis and inducing chromatid breaks at different specific concentrations followed by different periods of recovery have been revealed.

13. Heterocyclic bases—an aspect of their use in Cytochemistry. A. K. Sharma and D. De. *PHYTON*, 6(1) : 23-46, 1956.

*Abst.*—The properties of guanine, uracil and maleic hydrazide in affecting cell structure to a degree favourable for karyotype analysis have been tested. It has been noted that if these are applied in concentrations below the subnarcotic one, prior to treatment in dye-acid mixture, karyotypes can be well clarified. The study of fragmentation in subnarcotic concentrations and the fate of fragments following recovery have been studied.

14. An investigation on the possibilities of the use of phenols in chromosome analysis. A. K. Sharma and N. K. Bhattacharyya. Genetica, 28 : 121-142, 1956.

*Abst.*—The effect of 5 phenols have been tried for the purposes, all being proved to be successful in different concentrations, for temporary orcein smears. Possibilities of their use in permanent procedures have also been worked out.

15. An investigation on the effect of certain chemicals on the nucleus and their possibilities in chromosome analysis. A. K. Sharma and A. K. Bal. Proc. Nat. Inst. Sci. (Ind.), 1956, 22B : 57-68.

*Abst.*—Coumarin, Aesculin and solcin were tried in a number of monocots and dicots with success to a marked extent in Coumarin and lesser in Aesculin. Cold temperature is specially essential for Aesculin treatment. Their use for permanent preparations have also been worked out.

16. Chromosome breakage through paradichlorobenzene treatment. A. K. Sharma & N. K. Bhattacharyya. Cytologia, 21 : 353-360, 1956.

*Abst.*—Properties of paradichlorobenzene in causing fragmentation of chromosomes have been worked out following prolonged treatment. For karyotype analysis, a cautious use of the chemical is suggested.

17. A new concept of a means of speciation in plants. A. K. Sharma. Caryologia, 9(1) : 93-130, 1956.

*Abst.*—For vegetatively reproducing plants, a new means of speciation has been suggested, because of large scale karyotypic alterations noted in the somatic tissue of over 100 species of plants investigated with the help of other evidences, it has been claimed that these cells may enter into the growing tip of the daughter vegetative shoots and give rise to phenotypically different individuals.

18. Vegetatively reproducing plants—their means of speciation. A. K. Sharma and Archana Sharma (nee Mookerjee). Sci. Cult. 22 : 628-630, 1957.

*Abst.* The works done on karyotypic alterations in vegetatively reproducing plants have been summarised and their role in aiding speciation in the above plants has been discussed.

19. Fixity in chromosome number of plants. A. K. Sharma and Archana Sharma (nee Mookerjee), *Nature*, 177 : 335-336, 1956.

*Abst.*—On the basis of the inconstancy of chromosome number in somatic tissue of a large number of vegetatively propagating plants, the need of extreme caution while determining chromosome numbers of these groups have been pointed out. The importance of such variation in speciation has been emphasized.

20. Cytological basis of differentiation in Palms. A. K. Sharma and S. K. Sarkar. *Sci. Cult.*, 22 : 175-176, 1956.

*Abst.*—In certain Palms, like *Borassus*, chromosome numbers in different parts of the plant body, such as root tip and the base of the stem are found to be different. This phenomenon is supposed to explain the cytological basis of differentiation.

21. Karyotypic variation in Pteridophyta and their significance. A. K. Sharma and (Miss) Arati Majumdar. *Agron Lusit.*, 18 : 243-249, 1956.

*Abst.*—As irregularity in chromosome number in the somatic tissue of a large number of ferns has been noted, it has been suggested that the entrance of such irregular nuclei into the growing tip of the rhizome, thus forming a new individual with different phenotypic and genotypic characters may be means of speciation in the group.

22. An investigation on the karyotype of the genus *Crinum* and its phylogeny. A. K. Sharma and N. K. Bhattacharyya. *Genetica*, 28 : 263-296, 1956.

*Abst.*—Nine species of *Crinum* were subjected to cytological investigation following phenol technique—structural differences of chromosomes accounting for differentiation of species have been worked out and the lines of evolution indicated. Variation of chromosome complements in somatic cells have been noted and the significance of its occurrence discussed.

23. A cytological study of a few genera of Amaryllidaceae with a view to find out the basis of their phylogeny. A. K. Sharma and A. K. Bal. *Cytologia*, 21 : 329-352, 1956.

*Abst.*—Nine species of Amaryllidaceae were cytologically investigated following Coumarin and Aescuin techniques. The lines of evolution have been discussed and the role of structural and numerical alterations of chromosomes within the same somatic tissue in evolution has been pointed out.

24. A cytology of two varieties of *Polyanthus tuberosa* with special reference to their interrelations and sterility. A. K. Sharma and Miss Chitra Ghosh. *Genetica*, 28 : 99-111, 1956.

*Abst.*—Two horticultural varieties of *Polyanthus tuberosa* were cytologically investigated and the cause of sterility in the double variety has been worked out. Fifty chromosomes have been found in the double variety and sixty in the single.

25. A study of the cytology of four members of the Hydrocharitaceae as an aid to trace the lines of evolution. A. K. Sharma and (Miss) Bibha Bhattacharyya. *PHYTON*, 6(2) : 123-134, V, 1956.

*Abst.*—With the aid of different chemical treatments, the cytology of four different species of Hydrocharitaceae have been investigated and their lines of evolution indicated. The implications of variation in the somatic chromosome complements in evolution, noted in some of the species have been discussed.

26. Cytology of two members of *Alismaceae*. A. K. Sharma and R. N. Mukherji. Bull. Bot. Soc., Beng., 9 : 32-35, 1956.

*Abst.*—Cytology of two species of *Alismaceae*, viz., of *Alisma plantago* and *Limnocharis falva* have been worked out. An attempt has been made to trace their phylogeny and the importance of their somatic abnormalities in relation to speciation has been discussed.

27. Polyploidy in *Dioscorea*. A. K. Sharma and D. De. Genetica, 28 : 112-120, 1956.

*Abst.*—*Dioscorea sativa* and *D. alata* were cytologically studied and a polyploid series in *D. alata* was noted in different individuals. The significance of this and of different chromosome numbers in the same individual, as noted in certain cases, has been emphasised in relation to their vegetative propagation.

28. A cytological investigation of some members of the family *Cyperaceae*. A. K. Sharma and A. K. Bal. PHYTON, 6(1) : 7-22, 1956.

*Abst.*—Seven species of *Cyperaceae* have been cytologically investigated. Lines of evolution with different chromosome numbers within the family have been shown. No differentiation of constrictions has been noted in members of *Scirpus* and the centromere structure in them has been suggested to be probably like that of *Luzula*. The correlation between nucleoli and satellited chromosome has been established in species of *Fimbristylis*.

29. Cytology of some of the millets. A. K. Sharma and De. D. Caryologia, 8 : 294-308, 1956.

*Abst.*—Eight different species of *Gramineae* belonging to *Eleusine*, *Setaria* and *Pennisetum* have been investigated and multiples of nine have been noted as chromosome numbers of *Eleusine* and *Setaria* and seven of *Pennisetum*. Secondary association of bivalents has been found in *Setaria glauca*. Each genus has been supposed to represent a homogeneous line of evolution and the role of allopolyploidy in evolution has been pointed out.

30. A study of spontaneous chromosome fragmentation in *Vicia sativa* L. A. K. Sharma and N. K. Bhattacharyya. Cytologia, 23 : 361-375, 1956.

*Abst.*—Spontaneous fragmentation in the somatic tissue was noted following pre-germination soaking and pre-germination non-soaking in tap water. Analysis of the fragments under their occurrence frequency at different stages and their significance have been discussed. No marked differences in the two types of treatments have been recorded.

31. Cytogenetics of some members of *Portulacaceae* and related families. A. K. Sharma and N. K. Bhattacharyya. Caryologia, 8 : 257-274, 1956.

*Abst.*—Eight different species of *Portulacaceae* and its allied family *Aizoaceae* have been worked out. Distinct evidences have been produced showing the role of polyploidy in speciation within the family. The affinities of the members of *Aizoaceae* with *Portulaca* have been emphasised. Wider tolerance range of Polyploids as compared to Diploids has been shown.

32. Chromosome studies in some Indian Barley, II. A. K. Sharma & R. N. Mukherji. Proc. Ind. Acad. Sci., Vol. XLIII-B, p. 279-287, 1956.

*Abst.*—It involves a continuation of the programme of work on different strains of Barley already reported in the previous communique. Six strains of *Hordeum vulgare* have been investigated and the role of structural changes of chromosomes has been pointed.

33. Vitamins—their property of inducing chromosome division in adult cell of plants. A. K. Sharma & (Miss) Bibha Bhattacharyya. Caryologia, 9 (1) : 38-53, 1956.

**Abst.**—The capacity of nicotinic acid, succinic acid, thiamine and calcium pantothenate in inducing division in adult cells have been worked out. Polyploid constitution of the adult nuclei has been revealed and the way through which vitamins affect nucleic acid synthesis has been discussed.

34. Induction of chromosome division by ascorbic acid treatment. A. K. Sharma & A. Datta. *PHYTON*, 6 (2) : 71-78, V 1956.

**Abst.**—Ascorbic acid treatment at a particular concentration has been found to induce division in adult polyploid cells of onion roots. Somatic reduction too in the same concentration has been induced. Both these phenomena have been considered to be an outcome of a break in the nucleic acid balance of the cell.

35. Effect of irradiation on adult nuclei in plants. A. K. Sharma & R. N. Mukherji. *Genetica*, 28 : 143-164, 1956.

**Abst.**—Resting polyploid cells, under the influence of irradiation have been shown to undergo such a tremendous change that neither nucleic acid solution nor laevulose treatment after irradiation can cause division in them. But a mixture of base, sugar and phosphate is able to cause division because of its capacity of meeting up all the deficiencies caused by irradiation. It has also been noted that resting meristematic and resting adult nuclei are not affected in the same way thus giving an indication of their differential constitution.

36. Effect of inositol and molybdic acid in somatic nuclei of plants. A. K. Sharma & (Miss) Bibha Bhattacharyya. *PHYTON*, V (1) : 15-22, 1956.

**Abst.**—The above mentioned chemicals have been found to induce division in adult nuclei at different concentrations at varying periods of treatment. The chemicals have been shown to affect nucleic acid metabolism of the cell. The normal diploid cells, having full quota of nucleic acid, are induced to divide reductionally, while the normal adult differentiated cells, being already deficient in this chemical start dividing under conditions of treatment.

37. Chemical constitution and enzyme activity of chromosomes and related structures. A. K. Sharma & (Miss) Mira Roy. *La cellule*, LVIII : 109-133, 1956.

**Abst.**—A detailed study following acid extraction method and enzyme tests indicate that the main thread of the chromosome is composed of a non-basic pepsin-digestible protein. This is rich in phosphatase activity, hitherto unrecorded. Discontinuous segments of basic protein lie over this ultimate fibre, possibly in heterochromatic regions, and rich in alkaline phosphatase. A final envelope is the nucleic acid. Nucleolar and cytoplasmic chemistry have also been worked out.

38. The acid phosphatase test in the analysis of chromosome structure. A. K. Sharma & (Miss) Mira Roy. *PHYTON*, 7 (1) : 23-36, VI, 1956.

**Abst.**—The activity of acid phosphatase in plant cells is seen, following simple digestion experiments NA extraction and NA extraction followed by enzyme digestion.

39. Irradiation—its effect on young metabolic nuclei and the biochemical changes involved. A. K. Sharma & (Miss) Mira Roy. *La Cellule* LVII : fasc 3, pp. 337-354, 1956.

**Abst.**—Irradiation experiments were carried out with *Allium cepa* bulbs at different dosages and temperature. Observations were made at intervals of 24 hours on emerging new roots every day. The effect was thus supposed to be caused only on metabolic nuclei. At low dosages, a distinct change from the normal phosphatase activity was noted, which is followed by recovery to normality. In cold, the recovery is rapid, possibly due to restitution of broken ends. At 1,000r, the effect is drastic. The same frequency of fragments in cells irradiated at different phases of the resting stage indicate

that the broken ends can remain non-united for long. The non-union may possibly be due to a check in the Brownian movement of colloids. The present method provides the worker to deal with an assemblage of metabolic cells—all homogeneous as far as their response to irradiation is concerned.

40. Cytology of two species of Onagraceae with special reference to the structural hybridity of *Clarkia*. A. K. Sharma & S. K. Sarkar. *PHYTON*, 7 (2) : 69-76, 1956.

*Abst.*—Cytology of *Clarkia elegans* and *Jussiaea repens* were studied 2n number in them being 18 and 16 respectively. *Clarkia elegans* shows definite structural hybridity, evidenced by the formation of rings, chains, etc., during meiosis.

41. A study of the comparative effect of chemicals on chromosomes of roots, pollen mothercells and pollen grains. A. K. Sharma and S. K. Sarkar. *Proc. Ind. Acad. Sci.*, 45 : 298-293, 1957.

*Abst.*—A comparative study of the effects of Paradichlorobenzene, Aesculine and Resorcinol, applied individually on the chromosomes of roots, P. M. C.'s and pollen grains was made in *Nothoscordum fragrans*. Root tip chromosomes show fragmentation, erosion, etc. Pollen grains only diplochromosomes and P. M. C.'s irregularities in division. These show the differential metabolic set-up of the three types of chromosomes.

42. A theory regarding the stability of chromosome complement in a species. A. K. Sharma & Archana Sharma. *Naturwiss.*, 44 : 1, 17, 1957.

*Abst.*—After a thorough study of different groups of plants it has been shown that the shoot tip consists of cells with different chromosome numbers, in which normal numbers occur in highest frequency. In the leaf, the complement is constant and different from the 2n complement. It has been suggested that differentiation of organs is controlled by the entrance of different complements in different organs.

43. A cytological study of several members of the Liliaceae and their interrelationships. Archana Mookerjee. *Ann. Bot. Soc. 'Vanamo'*, 29 : 1-44, 1956.

*Abst.*—Twenty species of Liliaceae have been worked out cytologically including their detailed karyotype analysis for the first time specially from the cytotaxonomic standpoint. It has also been shown that their vegetative means of reproduction helps in their speciation.

44. Male sterility in Palms. S. K. Sarkar. *Agron. Lusit.*, 18 : 257-271, 1957.

*Abst.*—Factors for male sterility have been studied in 28 species of palms and the meiotic irregularities have been correlated with pollen sterility. It has been suggested that sexual reproduction is not absolutely essential for propagation and fruit production in Palms.

45. Karyotypic variation in *Scindapsus officinalis* Schott (Aroideae). U. C. Bhattacharyya. *Caryologia*, 9 (2), 286-292, 1957.

*Abst.*—Regular occurrence of varying chromosome numbers in the somatic tissue of *S. officinalis* has been brought out and its role in speciation through vegetative reproduction has been pointed out.

## ANTHROPOLOGY

During the year 1956-57, the papers read and discussions at the Symposium held in four sessions early in 1956 by Prof. K. P. Chattopadhyay as Convenor under the auspices of the UNESCO and the University of Calcutta, were published with Professor K. P. Chattopadhyay as Editor, in a volume entitled "Study of Changes in Traditional Culture".

Professor K. P. Chattopadhyay also helped the UNESCO Research Centre in India (located in Emerald Bower, Calcutta) in the preliminaries of their Research Project on Study of Culture change resulting from industrialisation. In this connection Prof. David Marshall, Head of the Humanities Division of the UNESCO visited the Department to discuss details with Professor K. P. Chattopadhyay.

The Government of India nominated Professor K. P. Chattopadhyay as a member, representative of the Government, on the Supervisory Committee of the UNESCO Centre (Steering Committee) for its meeting held on the 25th and 26th April, 1957. Resurvey of a group of villages studied in 1944-45 was continued by Prof. K. P. Chattopadhyay as part of a research project with the research grant provided by the University.

A paper on "Polyandry" was read by him in the section of Anthropology, Indian Science Congress and a paper on "Personality and Culture" contributed to the joint session with the section of Psychology.

## Published papers

- ... (1) Some changes in the Traditional Tribal Cultures—Study of Changes in Traditional Culture, Calcutta University, 1957.
- (2) Sari border changes—Study of changes in Traditional Culture, Calcutta University, 1957.
- (3) Changes in Santal Songs—Study of Changes in Traditional Culture, Calcutta University, 1957.

Sri T. C. Das completed his study of culture change resulting from industrialisation, in a project taken up under the All-India Institute of Social Work and Business Management.

Sri T. C. Raychaudhuri published a paper on 'The Kabui Naga of Manipur'—*Man in India*, Vol. 37, No. 3, 1957.

Dr. M. N. Basu published the following papers :—

- (1) Field Tools for the study of Social Science—Geographical Review of India, Vol. XVIII, No. 3, 1957. (Published in April, 1957).
- (2) Anthropology in the Service of the education of the aborigines—Presidential address at 31st All-India Educational Conference, Jaypur, 1956 (November), Aborigines Education Section.

Sri D. Sen carried out Field-Research in Pre-history during the period in Singbhum on the Neolithic Sites. Artefacts collected and further data obtained. Results are to be shortly published. He has published the following papers :—

- ... (1) A New Palaeolithic Site in Mayurbhanj jointly with G. S. Ray and A. M. Bettelle—*Man in India*, October-December, 1956, Vol. 36, No. 4.
- (2) The Soanian and the Pebble-tool complex in India—*Man in India*, April-June, 1957, Vol. 37, No. 2.

Sri G. S. Ray carried out Field-Research during this period on the Palaeolithic sites in Mayurbhanj. Stone implements as well as fossils were recovered which will throw much light on the chronology of the Palaeolithic cultures of Mayurbhanj. He has published a paper—

- ... (1) A New Palaeolithic Site in Mayurbhanj—jointly with Sri D. Sen and A. M. Betteille. *Man in India*, October-December, 1956. Vol. 36, No. 4.

Dr. S. S. Sarkar worked as a Senior Research Fellow of the National Institute of Sciences attached to this Department on the problem of Haemophilia and on Blood group and Finger Print and in collaboration with research scholar A. R. Banerjee on Hair structure. The published papers are—

- ... (1) Blood groups from Orissa (*Science and Culture*, September, 1956).  
 (2) The Incidence and Heredity of Haemophilia in India—(*Proc. Nat. Inst. Sci. Ind.* Vol. 22B, 1956.)  
 (3) Histological Differences between Negro and Oraon Hair (*Man in India*, Vol. 36, No. 4, 1956) (jointly with A. R. Banerjee).  
 (4) Finger Prints of Orissa Aborigines : (*Man in India*, Vol. 37, No. 3, p. 182.)

Dr. Miss J. Sharma worked as a Junior Research Fellow of the National Institute of Science of India, attached to this Department on Human Ecology.

Miss Papiya Bhattacharyya, M.Sc., University Research Scholar, worked on Cranial Capacity of Bengalees.

Sri S. Navlakha, M.Sc. worked on Jute Mill labourers and later in Bhil villages in Rajasthan to study culture change.

Sri G. Chattopadhyay, M.Sc., Government of India Research Scholar under R. T. Programme studied culture change in rural and tribal areas. He has published the following papers :—

- (1) Divination of Cause of Disease among Hos of Seraikella, by Gauranga Chattopadhyay, *Journal of Asiatic Society*, Vol. XXII, 1956.  
 (2) The Festival Jatra or Harmaghee of the Hos by Gauranga Chattopadhyay, *Journal of the Asiatic Society*, Vol. XXII, 1956.  
 (3) The Festival 'Maghe' of Seraikella Area, by Gauranga Chattopadhyay and Bikash Raychaudhuri, *Journal of the Asiatic Society*, Vol. XXII, 1956.

The distinguished archaeologist Dr. Gordon Childe visited the Department and gave a talk on " Interpretationist concepts in Prehistory."

Other distinguished visitors were Professor Ruben of the Berlin University. Professor Dyakov of the Moscow Academy and Prof. Kudriavtsev of Leningrad Academy.

## ZOOLOGY

1. Prof. J. L. Bhaduri is studying the comparative anatomy of Salientia and birds and carrying on investigation also into some endocrinological problems.

2. Sri D. Mukerji is carrying on investigation on the Butterfly fauna and studies on morphology of insects.

3. Sri G. K. Chakravarty is engaged in the systematic study of parasitic helminthic fauna.

4. Dr. S. P. Raychaudhuri is engaged in the study of the problems of radiation biology and a research scheme on Cytogenetical studies on animal chromosomes after various kinds of physical and chemical treatment also being investigated.

5. Sri M. M. Chakravarty is studying the morphology and life-history of parasitic protozoa.

6. Dr. D. N. Ganguly is engaged in investigating different problems in connection with Fish and Fisheries. He is also carrying on investigation in neuro secretory problems in animals.

7. Dr. Asok Ghosh is engaged in investigating hormonal control of Uropygial gland in Birds and sex endocrinology of Indian Reptiles.

Published papers—

Title of the paper

- |                            |   |
|----------------------------|---|
| (1) Prof. J. L. Bhaduri    | <p>"Further extension of range of the frog <i>Uperodon globulosum</i> (Gunther) in Jalpaiguri, West Bengal." (J. Bomb. Nat. Hist. Soc. 53 : 712-13, 1956).</p> <p>"The tadpoles of <i>Uperodon globulosum</i> (Gunth.)" (J. Bomb. Nat. Hist. Soc. 53 : 713-716, 1956).</p> <p>"The arterial system of the domestic pigeon (<i>Columba livia</i> Gmelin)." (Anat. Anz. 104, pp. 1-14, 1957).</p> <p>"Bovine gaecal gametokinetic activity in the male toad, <i>Bufo-stomaticus</i>." (Proc. Zool. Soc. Calcutta. Mookerjee Memorial Vol. 275-282, 1957).</p> |
| (2) Sri D. Mukerji         | <p>"Occurrence of a nematoid worm parasite on <i>Helopeltis theivora</i> Waterhouse." (Current Science, Vol. 25, 1956).</p>   |
| (3) Dr. S. P. Raychaudhuri | <p>"Effect of nitrogen mustard on the neoplastic chromosomes of two species of grasshoppers." (Proc. Zool. Soc. Calcutta).</p> <p>"X-ray induced chromosome breaks in grasshopper spermatocytes under varying conditions of wave length and temperature and their localization." (Proc. Zool. Soc. Calcutta).</p>   |
| (4) Dr. D. N. Ganguly      | <p>"A study of pH of the body of some parasitic ciliates and its effect on the host with a comment on the validity of Methyl green pyronin stain (Brachet)." (Archiv für Protistenkunde, 1956.)</p> <p>"The cytochemical effect of m-Xylohydroquinone and m-Xyloquinone (dimerised) on <i>Allium cepa</i> L." (Caryologia, 8, 1956)</p>   |
| (5) Dr. Asok Ghosh         | <p>"Some histological and histochemical observations of the caprine forestomach." (Ind. J. Physiol. and Allied Sci., 1957).</p>   |



## GEOLOGY

A short account of the research activities in the Department of Geology is given below :—

**Economic Geology** :—Investigation on coal of Upper Assam; studies on the Manganese and iron ore minerals of Orissa; Magnetite and Chromite deposits of Nansai; Manganese deposit of Tirodi, Bombay; Manganese deposit of Gangpur, Orissa; Limestone of Hathibari, Birmitrapur, Orissa; Iron ore deposit of Hathibari; Magnetite deposits of Khardih, Cuttuck, dt. Orissa; Graphite deposits near Daltonganj, Bihar; Manganese ore deposits of Joda area in Orissa.

**Petrology** :—Petrology of the Archaean rocks of different parts of Bihar, W. Bengal, Orissa, Bombay; Sedimentological studies on the Gondwana rocks of South Karanpura and Tertiary rocks of Assam and Orissa.

**Mineralogy** :—Mineralogy of the Lazulite-bearing magnetite from Sini, Saraikella.

**Structural Geology** :—Structure of the deformed conglomerates at the Western Part of Singhbhum Shear zone, structure of the metamorphosed limestones and associated sediments in parts of Gangpur anticlinorium around Hathibari, Birmitrapur, Orissa.

**Palaeontology** :—The work on fossil spores and pollen from the Lower Gondwans was conducted on a project on the palaeontological correlation of coal seams. This work included some of the major coalfields like the Raniganj, Karanpura North and South and Giridih. The following coal seams, viz., Salanpur A, Farewell, Laikdip, Rana Koithe and Poniat from the Raniganj; Manki, Churi, Ray top and bottom from the North and Argada, Sirka Upper and Lower from the South Karanpura and Bhadua seams from the Giridih, were examined and they yielded numerous fossil spores and pollen which were generically identified, and then tabulated in frequency diagrams.

Besides, a large number of larger plant fossils were also identified.

The work on the Baripada beds in Mayurbhanj, Orissa, involved the study of a fossil material belonging to mollusca, sharks, echinoids, ostracods and smaller foraminifers. The work on foraminifers from all the three different layers of rock from top to bottom elicited important information regarding the geological age of the beds.

## Published Papers

1. India's Fuel and Power Problems (Presidential address) by Prof. N. N. Chatterjee (Jour. Geol. Inst. 1956, Vol. 18, pp 9-25).
2. Mining Legislation—By Prof. N. N. Chatterjee, Bull. Geol. Min. Met. Soc. Ind. No. 17, (1956).
3. Sulphur forms in coal and their bearing on utilisation—by Prof. N. N. Chatterjee, Eastern Metal Reviewer, Annual Number, 1957.
4. Textural evolution of Kishengarh Ilmenite—by S. Raychaudhury and S. Roy National Inst. Ind. Proc, 1956.
5. Some aspects of Plagioclase Twining by Aniruddha De, Jour. Geol. Inst., 1956 Vol. 18 pp. 51-56.
6. Lazulite from Sini, Saraikella (Bihar) by Aniruddha De, Science and Culture, June, 1956, Vol. 21, No. 12, p. 746.
7. Zonal Metamorphism in the Balasun Valley, Darjeeling Himalaya—Aniruddha De, Quart. Jour. Geol. Min. and Met. Soc. Ind. 1956, Vol. 28, No. 3, p. 43-66.
8. Geology of the area around Jhagrakhand Coal field with special reference to the Plant Micro-fossils of the coal seams—by Asoke Kumar Dutt, Quart. Jour. Geol. Min. & Met. Soc. Ind. 1957, Vol. XXIX, No. 1.

9. Occurrence of *Eurypeasma*—Horizon near Manandragarb, M. P. by Asokekumar Dutt, Science and Culture. April, 1957, Vol, 22 No. 10, p. 569-570.
10. A Note on the occurrence of Spandite and Tirodite from Nagpur Dt. Bombay by Nitinkumar Basu, Science and Culture, April, 1957, Vol. 22, No 10, p. 576-578.
11. A note on the occurrence of a Crystalline Limestone band near Purna Ray, by R. N. Banerjee, Quart Jour Geol. Min. & Met. Soc. of India, Vol No. 28, No. 4. dated 1956
12. A brief note on the Micro-flora contents of the coal seams of the Giridih Coal field, Dist. Hazaribagh, Bihar, by T. K. Guha Sarkar, Quart. Jour. Geol. Min. & Met. Soc. of India, Vol. No. 28. No. 4, 1956.
13. A note on the metamorphic rocks around Rupnarayanpur, Burdwan Dist. by Deb Sankar Bhattacharyya, Quart. Jour. Geol. Min. & Met. Soc. of India, Vol. 28, No. 4, 1956.
14. A note on the Vanadium-bearing titaniferous magnetites of Nausahi, Keonjhar Dt. Orissa by S. Mukherjee, Quart. Jour. Geol. Min. & Met. Soc. of India, Vol 28, No. 4. 1956.
15. A note on the chromite deposits of Nausahi, Keonjhar dt. Orissa by S. Mukherji, Quart. Jour. Geol. Min. & Met. Soc. of India, Vol. 28, No. 4, 1956.
16. Geochemistry and Prospecting for ore deposits—Pradipkumar Gangopadhyay Jour. Geol. Inst. 1956, Vol. 18, pp. 26-33.

#### GEOGRAPHY

##### 1. Prof. S. P. Chatterjee :—

1. Pedogenesis in West Bengal—Some typical soils of Bankura District (Geo. Rev. Ind, Vol. XVIII No. 3).
2. Geomorphology of the Ranchi Plateau, Proc. Eighth General Assembly and International Congress of the International Geographical Union, Washington, 1956
3. The Effect of Partition on the Economic Geography of Bengal, Proc. Eighth General Assembly I.G.U. Washington.
4. Presidential Address delivered in the Land Use Section, International Geography Seminar Aligarh (in the Press).
5. Presidential Address delivered at the Annual General Meeting of Geographical Society of India, 1957 (in the Press).
6. A plea for the study of Geomorphology—"Observer", 1956.

##### 2. Sri N. K. Bose :—

1. "Personality and Culture change", Samiksa (Jour. Indi. Psychological Soc. Vol. 10 No. 2).
2. Correlation of the Glacial and Interglacial with the wet and dry phases of climate, Proc. Ind. Sci. Cong. 1957, reappeared in Man in India, Vol. 37 No. 1.
3. Translation from Oriya—"Regulations of the Kutta Mahasabha". Man of India, Vol. 37. No. 1.
4. "The effect of Urbanisation of work and Leisure". Man of India, Vol. 37, No 1.
5. Anthropology and Tribal Welfare, Man of India, Vol. 37. No. 3.
6. Culture Zones of India, Geog. Review. Ind. Dec. 1956 Vol. XVIII, No. 4.

##### 3. Sri K. G. Bagchi :—

1. Trends in Geography—Teachers' Quarterly Vol. 1, No. 3, Sept., 30, 1956.
2. The Kalighai—Barhouka Basin—Geo. Rev. India, Vol, XIX, No. 1, March, 1957.

## 4. Dr. R. Lahiri :—

1. Pedogenesis in West Bengal—Some Typical Soils of Bankura District, (Jointly with Dr. S. P. Chatterjee, S. Venkata Raman and S. N. Mukerjee).

\* Scientific classification of soil mapping. (Geographical Review of India) Vol. 18, No. 4.

## 5 Dr. Mrs. Meera Guha :—

Scope of Urban Geography in Regional Planning (International Geography Seminar, Aligarh-India.

## APPLIED PHYSICS

Research papers published by the teachers and research workers in the Department of Applied Physics :—

M. De—(1) An interference photometer for the measurement of amplitude distributions in diffraction patterns.

(Abstract :—An interference photometer is described which measures the distribution of intensity and phase in the image of a point source. It is a simple modification of the MACH-ZEHNDER type of interferometer, and is essentially an analogue computer for the evaluation of diffraction integrals. The photometric advantage of this method has been discussed in relation to the method of direct scanning. This interference method also gives the distribution of phase directly—a measurement which was not previously possible. The accuracy of the method is found to be greater than that to be expected from direct scanning methods. The effect of a finite size of source has also been studied in respect of the visibility of fringes and its influence on the results obtained.)

(Optica Acta, Vol. 3, 1957).

(2) Effect of source size on the visibility of fringes in an Interferometer employing division of amplitude.

(Abstract :—A simplified geometrical optical treatment is given of the problem of finding the optimum size of sources for an interferometer employing division of amplitude. The criterion, instead of being arbitrary, is chosen in relation to the limiting visibility of the fringes. An application to an almost generalised case of a two-beam interferometer is also given).

(Jour. Assoc. Applied Physicists, Vol. 3, No. 2, pp. 51-60, 1956).

S P Bhattacharyya—(3) Application of Tensor in Transformer Circuits I. Two Winding Transformer.

(Abstract :—The object of the present investigation is to apply tensor calculus to the solution of transformer circuits. The approach to the solution of electrical network problems suggested by Gabriel Kron offers an interesting method and has been applied here. This has been applied to a two winding transformer, being the simplest model of the transformer circuits. Results obtained have been compared with those obtained by the conventional methods thus clearly bringing out the basic assumptions of the latter method).

(Jour. Assoc. Applied Physicists, Vol. 3, No. 2, pp. 73-90, 1956).

B. Karunes—(4) Idealised Stress-Strain Relations for Real Materials.

(Abstract :—Discussing the actual behaviour of materials under load, i.e. considering the anelastic behaviour within yield limit the permanent set in the 'preplastic' range, creep recovery and several other factors, the author has suggested that instead of idealising the materials by assuming them to be perfectly rigid, elastic or plastic as is done in classical mechanics a much more efficient theory may be propounded by keeping the material behaviours real but idealising the mathematical relations between stress and strain. A set of Tensor Relations had been discussed in detail embracing both mathematical and physical implications).

(Proc Second Congress of Theoretical and Applied Mechanics, New Delhi, 1956).

**B. Karunes—(5) Generalised Stress-Strain Relations.**

(Abstract :—To include the realities in behaviour of usual structural materials, e.g. anelastic behaviour in the preplastic range, strain hardening causing increased yield point, hysteresis etc., and at the same time to have a mathematically workable set of stress-strain laws the author assumes that the total strain is comprised of three independent parts, (i) an elastic strain  $\epsilon_e$  which completely recovers as soon as the stress is removed. (ii) an anelastic strain  $\epsilon_a$  which recovers slowly after the removal of the stress and (iii) a permanent plastic strain  $\epsilon_p$ . The relations of  $\epsilon_e$ ,  $\epsilon_a$  and  $\epsilon_p$  with the stress  $\sigma$  should be such that the graph of  $\sigma$  against  $(\epsilon_e + \epsilon_a + \epsilon_p)$  generally tallies with the experimentally obtained stress-strain graph. In the paper suggestions of such relations are discussed.

(Jour. Assoc. Applied Physicists, Vol. 4, No. 1, pp 21-26, 1957).

**S. P. Bhattacharyya—(6) Application of Tensor in Transformer Circuits II. Parallel Operation of two Winding Transformers.**

(Abstract :—This is a continuation of the work in the application of tensors in transformer circuits. A general method has been developed to deal with the parallel operation of a number of two winding transformers. This has been illustrated by applying the method to two transformers in parallel).

(Jour. Assoc. Applied Physicists, Vol. 5, No. 1, pp. 27-38, 1957).

**A. K. Sen & G. N. Bhattacharya—(7) Dielectric Properties of Ester Gum.**

(Abstract :—The dielectric properties of ester gum have been measured over a wide range of temperature and frequency viz., from 22°C to 140°C and from 400 cycles per second to 300 kcs. The resin shows characteristic polar properties and the region of anomalous dispersion extends over a wide range. The maximum value of dielectric loss at any frequency is less than that demanded by Debye's theory and the  $\epsilon''/\epsilon'$  plot against  $f/f_g$  gives a much blunter curve than the theoretical one indicating thereby a distributed relaxation time of the orientating dipoles. The radius of the rotating unit calculated from data reported here and the melt-viscosity data published earlier gives an average value of 1.5 Å only, which is the same as that of a hydroxyl group. From the consideration of composition of ester gum it has been postulated that the dielectric loss of this resin is mainly due to the presence of glyceryl mono- and di-acetates in this resin).

(Communicated to Indian Journal of Physics on 5th April, 1957 for publication).

**A. K. Sen & G. N. Bhattacharya—(8) Melt Viscosity of Ester Gum.**

(Abstract :—Melt viscosity of Ester gum has been measured over the range of temperature between 90°C and 125°C and activation energy for viscous flow has been calculated. The activation energy has been found to change abruptly round about 106°C. The value of the activation energy has also been confirmed from the results of measurement of electrical resistivity of the material. The implications of this change of activation energy at 106°C has been discussed in this paper).

(Communicated to Journal of Association of Applied Physicists on 22nd May, 1957 for publication)

## RADIO PHYSICS AND ELECTRONICS

Research work in the following branches were carried out during the year under review in Department of Radio Physics and Electronics :—

### A. Ionospheric Investigations

1. Regular Ionograms (Sweep Frequency Ionospheric Records) were obtained at 10 minute intervals with the automatic ionosphere recorder at the Ionosphere Field Station, Haringhata, in a routine, round the clock schedule.

2. The ionograms were subjected to routine scaling programmes for determining the various ionospheric parameters. Hourly values of the following characteristics were communicated for publication to the Radio Research Committee of the C.S.I.R.

foF2, h'F2, foF1, h'F1, foE, h'E, fEs and M(3000)F2.

3. Critical examination of the ionograms were continued with a view to study (a) the ratio of production of electrons in the F-region and their decay by recombination processes, (b) the sunrise effect in the E and F regions and (c) some peculiar behaviour of the night-time F-region.

4. The various available models of the lower ionosphere (D and E layers) were critically examined in the light of results of ionosphere absorption measurements. Conditions which are to be satisfied by an acceptable E-region model have been discussed.

5. The Ionosphere Field Station at Haringbata has been selected to operate as one of the 'key Ionospheric Stations' in the International Geophysical Year Programme, 1957-58, and preparations were made during the period under review for the additional work entrusted with the Field Station during the I.G.Y.

#### B. Transistors

An exact solution of the one-dimensional diffusion equation of the junction type transistors has been obtained. Transient response of the grounded base junction transistor amplifier with a small load impedance has been obtained theoretically and also verified experimentally.

Theoretical and experimental study of the causes of drift in a transistor amplifier has been done.

#### C. Electron Tubes

Work on electron tubes has been intensified since September, 1958 when the Unesco Expert, Dr. H. F. Steyskal joined the Institute. The aim of the work was to improve the research facilities of the existing electron tube laboratory and to develop various special processes involved in electron tube making, especially with regard to all metal tubes, including microwave tubes, e.g. magnetrons. The equipment of the laboratory has been enlarged by the following items.

1. Two high vacuum pumping units with provision for measuring pressures of  $10^{-7}$  mm Hg.

2. A Tubular Hydrogen Furnace for temperatures up to  $1000^{\circ}\text{C}$ .

3. A large chamber for heat treatment in protective atmosphere at temperatures up to  $1200^{\circ}\text{C}$ .

4. A strain viewer for glass ware.

5. A Ball Mill for powdering chemicals.

6. An apparatus for spraying insulating coatings and emission pastes.

7. An Electrolytic trough for investigation of potential fields.

8. A 6 KW R.F. heating unit (Gift from Unesco).

9. A glass lathe.

Furthermore, the following processes have been developed practically.

Manufacturing of graded glass seals and tubular seals between glass metals like copper and kover. vacuum tight brazing of metals in protective atmospheres and in vacuum, fabrication of special brazing alloys, electroplating, precision machining of magnetron parts, manufacturing of plane and cylindrical oxide cathodes and their appropriate filaments. Finally the properties of self made oxide cathodes and the activation schedule of thoriated tungsten cathodes were investigated and satisfying results obtained.

#### D. Radio Astronomy

Preparatory work for the measurement of solar radio noise during outbursts has been continued. A stabilised power supply for the U.H.F. receiver

(100 Mc/s) was constructed during the period under review. The design of a pre-amplifier stage for the receiver has been completed and the instrument is at present under construction.

#### E. *Electronic Computers*

Two new computing elements have been added to the Electronic Differential Analyser constructed last year. These are :

1. A multiplier and function generator.
2. A Delay operator and time function generator.

#### F. *Ultra-high Frequency Technique*

Theoretical study of the properties of a helical rhombic antenna was done

#### G. *Electrical Discharge*

Investigations were carried out on the mechanism of electrical discharge in an ozoniser type of discharge tube, placed in uniform magnetic field. Observations were also made on electrodeless discharge in tubes of simpler geometry.

#### H. *Electromagnetic Theory*

Analysis has been made for the propagation of a step function pulse in side a homogeneous and isotropic medium. The effect of displacement current on the nature of propagation has been taken into account. It has been shown that measurement of the initial and final values of one of the non-vanishing field components specifies accurately the values of conductivity and permittivity of the medium.

Research papers published during the year by the members of the teaching staff, Research Scholars and Research Assistants during the period under review :

1. On the Design of Four—terminal Interstage for Pulse Application by A. K. Choudhury and N. B. Chakraborty—Indian Journal of Physics, Vol. 31, No. 4, April, 1957, pp. 193-210.

##### *Abstract :*

The work is devoted to the design of four terminal networks having prescribed input and output capacitance for a fast transient response with little or no overshoot. Conditions that the time response of the network has no overshoot and bounds on the time response set by the capacities have been obtained. The pole configurations that may achieve the desired characteristics are described. Methods for realising the required pole distributions are formulated and some circuit arrangements suggested.

2. R C Network Analogue by A. K. Choudhury and B. R. Nag—Indian Journal of Physics, Vol. 31, No. 3, March, 1957.

##### *Abstract :*

An R-C analogue for obtaining the steady state and transient response of networks is described. Zeros and poles of the network functions are realised by a system of cascade feedback amplifiers. Root loci of the transfer function of a few basic networks for the feedback amplifiers have been studied. A method of solving polynomial equations using the analogue is also described.

3. Propagation of Transient Electromagnetic Waves in a Medium of Finite Conductivity by Bimal Krishna Bhattacharyya—Geophysics, Vol. 22, No. 1, pp. 75-88, 1957.

##### *Abstract :*

Transient electric and magnetic fields have been calculated for ramp function and saw tooth current sources immersed in a semi-conducting medium. An electric dipole source has been assumed. In the case of ramp function input, it is observed that the peaks of the overshoots in the  $\theta$ -component of

the electric field decrease in magnitude with the increase in rise time of the input pulse. It has also been shown that the rise time of the current pulses has definite effect upon the rise time and amplitude of the electric fields and that the saw tooth exciting pulses having large values of rise time may be conveniently used to obtain measurable values of the electric and magnetic fields.

4. On the Determination of Electron Density Distribution in the Ionospheric Regions from h'-f Records by A. K. Saha—Indian Journal of Physics, Vol. 30, p. 464 (1956).

*Abstract*—Comparative studies have been made of the various available methods for the determination of the height distribution of electrons in the ionospheric layers. It is concluded that, for routine ionospheric work, Ratcliffe's method is the quickest though, under restricted conditions, some of the other methods yield more accurate results. Methods which take into account the effect of earth's magnetic field have also been studied. It was, however, found that the errors due to the neglect of the magnetic field are of the same order as the limits of observational errors in height measurement. The complications involved in including the magnetic field are, therefore, not warranted. This is particularly because, the inclusion of the magnetic field affects only the thickness of the layer and not its height of maximum ionisation, and the MUF is mainly controlled by the latter.

5. Recombination Coefficient and Electron Production Rate from Total Electron Content in Unit Column below the level of Maximum Ionisation by S. Datta—Indian Journal of Physics, Vol. 31, No. 1, Jan., 1957, pp. 43-52.

*Abstract*—The paper describes the results of computation of the mean combination coefficient ( $\alpha$ ) and the mean electron production rate ( $q$ ) in the F region on quiet days. The diurnal variation of  $n$  the total number of electrons in a column of unit cross section extending from the "bottom" to the maximum ionisation density height of the same region is utilised for the purpose. The values of  $n$  and its diurnal variation, in their turn, are computed from the P'-f records of the automatic ionospheric recorder installed at Haringhata (Calcutta).

Night-time average values of  $\alpha$  obtained by the same method, show a marked seasonal change, the maximum being in December ( $\alpha = 10.8 \times 10^{-10}$  c.c. per sec. per electron) and the minimum in June ( $\alpha = 2.2 \times 10^{-10}$  c.c. per sec. per electron). Assuming that the recombination coefficient falls off at an exponential rate,  $\alpha_m e^{-pz}$  (where  $z$  is the reduced height,  $\alpha_m$  is the recombination coefficient at the maximum ionisation height and  $p$  is a constant), a method has been suggested for determining the value of  $p$  from the recombination rate in the unit column and that at the maximum ionisation density height.

#### APPLIED CHEMISTRY

(i) The studies on the seed fats of 'Cucurbitaceae' family rich in conjugated acids (the component fatty acids of *Momordica dioica* and *Tricosanthes cucumerina*)—M. M. Chakrabarty, S. Bhattacharyya, M. J. Desai and S. A. Patel, *Die Naturwissenschaften*, Oct., 1956, Heft 22, S.523-24, 43 Jahrgang.

(ii) The chemical examination of the seed fats from *Bischofia Javanica* Blume and *Antidesma diandrum* Roth. Seed fats of the *Euphorbiaceae* family—Part II, S. Sarkar, M. M. Chakrabarty, *Science and Culture*, Vol. 22, pp. 336-37, Dec., 1956.

(iii) Variation in the composition of Kamala seed oil (Lipid matter from the seeds of *Mallotus Philippensis*)—M. M. Chakrabarty, & S. Bhattacharyya, *Die Naturwissenschaften*, Dec., 1956, Heft. 4, S.97, 44 Jahrgang.

- (iv) Chromatographic separation of glycerides—D. K. Gupta, B. T. R. Iyengar, M. M. Chakrabarty, *Science & Culture*, Vol. 22, pp. 400-01, Jan., 1957.
- (v) Studies on the Decarboxylation of fatty acids—M. M. Chakrabarty, D. Palit, *Science & Culture*, Vol. 22, pp. 464-65, Feb., 1957.
- (vi) The seed fat composition of *Citrullus colocynthis*—A. Sengupta & M. M. Chakrabarty, *Science & Culture*, pp. 581-82, April, 1957.
- (vii) Esterification of castor oil with Phthalic anhydride, Part I—A. N. Saha, *Science & Culture*, 22, 510, 1957.
- (viii) Studies on Assam Blue oil Fractions, Part I—A. N. Saha, *J. Ind. Chem. Soc., Ind. & News Ed.*, 19, 29, 1956.
- (ix) Studies on Wrinkle finish—A. N. Saha, *J. Ind. Chem. Soc., Ind. & News. Ed.*, 20, 23, 1957.
- (x) Preparation of mono-glycerides and their halogenation—A. N. Saha, *J. Ind. Chem. Soc., Ind. & News Ed.*, 20, 1957.
- (xi) Light scattering measurements of Cellulose solutions in concentrated acids—P. K. Choudhury, *J. Polymer Sc.*, 20, 218, 1956.
- (xii) Modified F.D.T.A. method for the direct estimation of Magnesium—K. L. Roy, *Analytica Chimica Acta*, 14, 504, 1956.
- (xiii) Enzymatic synthesis of ascorbic acid in animal tissues—I. B. Chatterjee, N. C. Ghosh, J. J. Ghosh, R. N. Roy and B. C. Guha, *Science & Culture*, 23, 50-51, 1957.
- (xiv) The Enzyme system involved in the biosynthesis of ascorbic acid by animal tissues *in vitro*—I. B. Chatterjee, N. C. Ghosh, J. J. Ghosh and B. C. Guha (communicated to International Symposium on Enzyme Chemistry, Japan).
- (xv) Effect of cyanide on the biosynthesis of ascorbic acid *in vitro*—I. B. Chatterjee, N. C. Ghosh, J. J. Ghosh and B. C. Guha (accepted for publication in *Science*).
- (xvi) Paper electrophoresis of Avian and Mammalian haemoglobin—A. K. Saha, R. N. Dutta, J. J. Ghosh—*Science*, 125, 417-48, 1957.



## APPENDIX G

### COMMITTEES

- 1) Committee to consider the letter from the University Grants Commission *re* establishment of a chair in Spanish :  

Prof. P. N. Banerjee.  
 Prof. J. P. Niyogi.  
 Sri Gopal Halder.
- (2) \*Selection Committee for appointment to the Adharchandra Mookerjee Lectureship for 1956 :  

The Vice-Chancellor.  
 The Vice-President, University College of Arts.  
 Dr. P. C. Gupta.  
 Prof. N. K. Sinha.
- (3) Committee for the appointment of Stephanos Nirmalendu Ghosh Lecturer for 1957 :  

The Vice-Chancellor.  
 Sri Ramaprasad Mookerjee.  
 Dr. Pramathanath Banerjee.  
 Dr. P. C. Lahiri.  
 Prof. Sisir Maitra.
- (4) \*Board of Adjudicators for the award of the Zainul Abedin Gold Medal for 1956 :  

Prof. M. Z. Siddiqi.  
 Aga Mirza Mohsin Namazie.  
 Maulana Said Ahmed Akbarabadi.  
 Prof. S. Mohsin Namazie.  
 Mr. Abdul Qadir.  
 Prof. Hiralal Chopra.
- (5) Committee to consider Inspection Reports on schools which have applied for recognition for training of candidates for the B.T. Examination :  

The Vice-Chancellor.  
 The D. P. I., West Bengal.  
 Principal, David Hare Training College.  
 The University Inspector of Colleges.  
 Sri K. K. Mookerjee.  
 Prof. S. P. Chatterjee.  
 Sri Arunkumar Sen.  
 Sri B. K. Niyogi.
- (6) \*Special Committee for the appointment of the Raghunath Prasad Nopany Lecturer for 1956 :  

The Vice-Chancellor.  
 The Vice-President, University College of Arts.  
 The Head of the Department of Ancient Indian History and Culture.  
 Dr. B. C. Sen.  
 Dr. P. C. Gupta.

- (7) \*Selection Committee for the appointment of the Lady Brahmachari Reader in Medicine for 1957 :

The Vice-Chancellor.  
The Dean of the Faculty of Medicine.  
Prof. B. C. Guha.  
Sri K. C. Chaudhuri.  
The Principal, Medical College.  
The Principal, R. G. Kar Medical College.  
Dr. R. N. Chaudhuri.  
Dr. P. N. Brahmachari.  
Dr. J. C. Banerjee.

- (8) The Governing Body of Sir Taraknath Palit Trusts :

Sri Nirmalkumar Sidhanta, *Vice-Chancellor*.  
The Director of Public Instruction, West Bengal.  
Dr. Bidhanchandra Roy.  
Dean of the Faculty of Science.  
Dean of the Faculty of Engineering.  
Prof. Nikhilranjan Sen.  
Sri Ramaprasad Mookerjee.  
Sri Prasantakumar Bose.  
Prof. Bhupendranath Ghosh.  
Prof. Basantidulal Nagchaudhuri.  
Sri Ramanimohan Ray.

- (9) The Board of Management of the Sir Rashbehary Ghose Endowment :

Sri Nirmalkumar Sidhanta, *Vice-Chancellor*.  
The Director of Public Instruction, West Bengal.  
Prof. Nikhilranjan Sen.  
Sri Atulchandra Ray.  
Dr. Praphullakumar Bose.  
Sri Amiyakumar Sen.  
Prof. Anantakumar Sengupta.  
Prof. Pulinbehari Sarkar.  
Prof. Bireschandra Guha.  
Sri Prasantakumar Bose.  
Prof. J. N. Bhar.

- (10) The Board of Management of the Khaira Fund :

Sri Nirmalkumar Sidhanta.  
Prof. Jitendraprasad Niyogi.  
Prof. Nikhilranjan Sen.  
Prof. Pramathanath Banerjee.  
Sri Ramaprasad Mookerjee.  
Prof. Suniti Kumar Chatterji.  
Prof. Jogendrachandra Bardhan.  
Prof. Pabitrakumar Sen.  
Prof. Niharranjan Ray.  
Prof. Sukumar Sen.  
Sri Rathindranath Tagore.  
Kumar Baijnath Prasad Singh.

(11) The Press & Publication Committee :

The Vice-Chancellor.  
The Treasurer.  
Sri Ramaprasad Mookerjee.  
Sri Chapalakanta Bhattacharyya.  
Sri Bidhubhushan Ghosh.  
Sri Gopal Halder.  
Sri Mohitkumar Maitra.  
The Superintendent, University Press, *Jt. Secretary*.

(12) The Establishment Committee :

The Treasurer.  
The Director of Public Instruction, West Bengal.  
Sri Ramaprasad Mookerjee.  
Sri Nandakisor Ghosh.  
Sri Mohitkumar Maitra.  
The Registrar, *Secretary*.

(13) The College Committee (Professional) :

The Vice-Chancellor.  
The Treasurer.  
The Dean of the Faculty of Medicine.  
The Dean of the Faculty of Engineering.  
Prof. Pramathanath Banerjee.  
Sri Kshirodchandra Chaudhuri.  
Sri Bidhubhushan Ghosh.  
The University Inspector of Colleges, *Secretary*.

(14) The College Committee (Other than Professional) :

The Vice-Chancellor.  
The Treasurer.  
The Dean of the Faculty of Arts.  
The Dean of the Faculty of Science.  
Sri Chapalakanta Bhattacharyya.  
Sri Gopal Halder.  
Sri Prasantakumar Bose.  
University Inspector of Colleges, *Secretary*.

(15) The Committee to consider Legal matters :

The Vice-Chancellor.  
Prof. P. N. Banerjee.  
Sri Ramaprasad Mookerjee.  
Sri N. K. Ghosh.  
Sri S. N. Modak.

(16) Committee re Constitution of Governing Bodies of Colleges :

The Vice-Chancellor.  
Sri S. C. Ghosh.  
The Director of Public Instruction, West Bengal.  
Prof. P. N. Banerjee.  
Sri R. P. Mookerjee.  
Sri Chapalakanta Bhattacharyya.  
Sri Gopal Halder.  
Sri P. K. Bose.  
Sri Kalidas Ray.

(17) The Works Committee :

The Vice-Chancellor.  
 The Treasurer.  
 Sri Chapalakanta Bhattacharyya.  
 Sri Bidhubhushan Ghosh.  
 Prof. Bireschandra Guha.  
 Prof. J. L. Bhaduri.  
 Sri Kalidas Ray.  
 The Secretary, Councils of the University College of  
 Science and Technology (*co-opted*).

(18) The Standing Committee of the Syndicate :

Sri Prasantakumar Bose.  
 Sri Chapalakanta Bhattacharyya.  
 Sri Kshirodchandra Chaudhuri.  
 Dr. Subodh Mitra.  
 Sri Bidhubhusan Ghosh.  
 Sri Nandakishor Ghosh.  
 Sri Gopal Halder.  
 Sri Satyendranath Modak.  
 Sri Kalidas Ray.

(19) The Finance Committee :

Sri Satischandra Ghosh, *Treasurer*.  
 Sri Dhirendranath Mitra.  
 Prof. Sarojkumar Basu.  
 Prof. Bireschandra Guha.  
 Sri Ramaprasad Mookerjee.  
 Sri B. T. Thakur.

(20) The Steering Committee for the Centenary Celebrations :

Sri Nirmalkumar Sidhanta, *Vice-Chancellor*.  
 Prof P. N. Banerjee.  
 Sri S. C. Ghosh.  
 Prof. J. P. Niyogi.  
 Prof. B. C. Guha.  
 Prof. N. K. Sinha.  
 Sri P. K. Bose.  
 Sri N. K. Ghosh.  
 Sri B. B. Ghosh.  
 Sri N. K. Munshi.  
 Sm. Mira Dattagupta.  
 Sri H. K. Chatterjee.  
 Sri K. Basu.  
 Sri N. C. Bhattacharyya.  
 Dr. D. Chakravarti, *Secretary*.

## (21) Calcutta University Sports Board :

The Chancellor—*President*.The Vice-Chancellor—*Vice-President*.

1. Sri N. K. Ghosh.
2. Sri S. C. Ghosh.
3. Secretary, Council of the University College of Arts.
4. Secretary, Council of the University College of Science.
5. Rev. Fr. C. K. Leeming.
6. Dr. J. K. Chowdhury.
7. Prof. M. L. Roychowdhury.
8. Sri G. D. Mukherjee.
9. Sri D. S. Chakravarti.
10. Sri A. N. Dutta.
11. Principal Arun Sengupta.
12. Sri D. K. Chowdhury.
13. Sri S. Dasgupta.
14. Sm. S. E. Rani Ghose.
15. Sri Sailaja Roy.
16. Dr. N. K. Sen.
17. Major P. C. Mazumdar.
18. Sri P. K. Banerjee.
19. Prof. Santimoy Roy.
20. Sri Sachindranath Banerjee.
21. Sri A. N. Chatterjee.
22. Dr. D. Chakravarti.
23. Sri P. K. Mitra.
24. Sri S. K. De.

## (22) Librarianship Training Committee for 1956-57 :

The Vice-Chancellor.

The Director of Public Instruction, West Bengal.

Prof. P. N. Banerjee.

Sri P. K. Bose.

Sri B. B. Ghosh.

Sri Gopal Halder.

Dr. P. C. Lahiri.

Sri Pramilchandra Basu.

## (23) Committee appointed to consider the resolutions passed by the All-India Federation of Educational Associations :

Prof. J. P. Niyogi.

Prof. N. R. Sen.

Prof. B. C. Guha.

Prof. S. P. Chatterjee.

## (24) Committee appointed to draw up an overall Scheme for Collegiate Education in the State of West Bengal :

The Vice-Chancellor.

Sri Satischandra Ghosh.

Prof. P. N. Banerjee.

Prof. J. P. Niyogi.

Prof. N. R. Sen.

Sri Amiyakumar Sen.

Sri Prasantakumar Basu.

- (25) \*Committee appointed to consider proposals for changes in the Statutes relating to enrolment in the Register of Graduates :

Prof. Jitendraprasad Niyogi.  
Sri Nandakisor Ghosh.  
Sri Chapalakanta Bhattacharyya.  
Sri Gopal Haldar.

- (26) \*Selection Committee for the appointment of the Taraprasad Khaitan Lecturer for 1956 :

The Vice-Chancellor.  
Prof. Niharranjan Ray.  
Prof. Pulinbehari Sarkar.  
Sri Kaliprasad Khaitan.

- (27) Committee appointed to define general policy to run Calcutta Review :

The Vice-Chancellor.  
Prof. P. N. Banerjee.  
Prof. J. P. Niyogi.  
Sri Chapalakanta Bhattacharyya.  
Sri Gopal Haldar.

- (28) Committee appointed to consider the question of establishing an Institute of Legal Studies and Research for Post-Graduate Studies and Research in Law :

The Vice-Chancellor.  
Dr. Radhabinod Pal.  
Dr. S. N. Banerjee.  
Principal, University College of Law.  
Principal, Surendranath Law College.  
The Chief Justice of the Calcutta High Court.  
Sri Ramaprasad Mookerjee.  
Sri Nandakisor Ghosh.  
Sri Chapalakanta Bhattacharyya.  
Sri Sankardas Banerjee.  
Sri R. C. Mitra.  
Dr. H. Sanyal.  
Sri Atul Gupta.  
Sri R. K. Deb.  
Sri R. M. Chatterjee.  
Sri Santosh Bose.

- (29) Committee appointed to consider applications from colleges for participation in the Government grant :

The Vice-Chancellor.  
Prof. Pramathanath Banerjee.  
Prof. Bireschandra Guha.  
The University Inspector of Colleges.

- (30) Committee appointed to consider the procedure of examination of the Theoretical answer-scripts independently by two examiners for the B.A. and B.Sc. Honours Examinations :

Prof. Jitendraprasad Niyogi.  
Prof. Nikhilranjan Sen.  
Prof. Bireschandra Guha.

- (31) Committee to consider the scheme for re-organising the Appointments and Information Board and Students' Advisory Bureau (Overseas) :

The Vice-Chancellor.  
 Prof. P. N. Banerjee.  
 Sri R. P. Mookerjee.  
 Prof. B. C. Guha.  
 Sri N. K. Ghosh.

- (32) \*Committee appointed to enquire into and report on the working of the System of scrutiny and re-examination obtaining in the University :

The Vice-Chancellor.  
 Sri Satischandra Ghosh.  
 Prof. P. N. Banerjee.  
 Sri R. P. Mookerjee.  
 Prof. J. P. Niyogi.  
 Capt. P. B. Mookerjee.  
 Sri Keshaveswar Basu.  
 Sri Rajkumar Chakrabarti.  
 Sri P. K. Bose.  
 The Controller of Examinations.

- (33) Committee for the award of Debendranath Hemlata Gold Medal for 1956 :

Sri Satischandra Ghosh.  
 Sri Nandakisor Ghosh.  
 Lt. Col. B. P. Sur.  
 Sri Kshirodchandra Chaudhuri.  
 Sri A. Chatterjee.

- (34) Committee appointed to consider a resolution from West Bengal Teachers' Association on the scheme of Youth Welfare :

Prof. J. P. Niyogi.  
 Dr. P. C. Lahiri.  
 Sri P. K. Bose.

- (35) Committee appointed to consider the question of desirability of setting up Centenary Book banks and Centenary Research Scholarship :

Prof. Jitendraprasad Niyogi.  
 Prof. Nikhilranjan Sen.  
 Sri Prasantakumar Basu.  
 Sri Gopal Halda.

- (36) Committee appointed to consider the Government Notification re transfer of territories from Bihar to West Bengal :

The Vice-Chancellor.  
 The Director of Public Instruction, West Bengal.  
 Prof. Pramathanath Banerjee.  
 Sri Ramaprasad Mookerjee.  
 Sri Satyendranath Modak.

- (37) \*Committee for the selection of Guruprasanna Ghosh Scholarship for 1957 :

The Vice-Chancellor.  
 Sri Ramaprasad Mookerjee.  
 Sri Kalidas Ray.  
 Prof. Nikhilranjan Sen.

- (38) \*Selection Committee for the award of Sibley Scholarship for 1957 :

The Vice-Chancellor.  
 Prof. P. N. Banerjee.  
 Sri Ramaprasad Mookerjee.  
 Sri Bidhubhushan Ghosh.  
 Sri Atulchandra Ray.  
 Sri Kalidas Ray.

- (39) Committee appointed on the suggestion of the Government of India re the amalgamation of the Calcutta Madrasah with the Islamic Group of the Calcutta University :

The Vice-Chancellor.  
 Dr. Parimal Ray.  
 Prof. P. N. Banerjee.  
 Prof. J. P. Niyogi.  
 Prof. M. Z. Siddiqi.

- (40) Committee appointed to consider the rules sent by the University Grants Commission for the introduction of the scheme for promoting study of selected regional languages at the Indian Universities :

Prof. Jitendraprasad Niyogi.  
 Sri Gopal Haldar.

- (41) Committee appointed to consider certain resolutions passed at the 31st session of the West Bengal Colleges and University Teachers' Association :

Prof. J. P. Niyogi.  
 Sri Gopal Haldar.  
 Dr. P. C. Lahiri.  
 Sri P. K. Bose.

- (42) Committee appointed to consider the question of selection of the site and construction of the University Law College and its hostels :

The Vice-Chancellor.  
 The Treasurer.  
 Prof. P. N. Banerjee.  
 Sri N. K. Ghosh.

- (43) Committee appointed to consider the question of publishing certain Bengali books outside the University Press :

Prof. J. P. Niyogi.  
 Prof. Sashibhusan Dasgupta.  
 Sri Gopal Haldar.

- (44) Committee of Management of the Viharilal Mitra Institute :

The Vice-Chancellor.  
 Prof. Pramathanath Banerjee.  
 Sri Ramaprasad Mookerjee.  
 Dr. Subodh Mitra.  
 Sri Chapalakanta Bhattacharyya.  
 Sri Mohitkumar Maitra.  
 Prof. Jitendraprasad Niyogi.  
 Sm. Jyotiprabha Dasgupta.  
 Dr. Asima Chatterjee.  
 Sm. Mira Dattagupta.



- (45) \*Committee appointed to draw up a scheme and implement the proposal for introduction of the Diploma Course in Museology :

Prof. Pramathanath Banerjee.  
 Prof. Niharranjan Ray.  
 Sri Ramaprasad Mookerjee.  
 Sri Devaprasad Ghosh.

- \*Selection Committee for the award of the Sarojini Basu Medal for 1957 :

The Vice-Chancellor.  
 Dr. P. C. Lahiri.  
 Prof. S. B. Dasgupta.  
 Dr. Susilkrishna De  
 Sri Jagadischandra Bhattacharyya.

- (47) Selection Committee for the award of the Viharilal Mandakini Scholarship for 1957 :

University Professor of Applied Chemistry.  
 University Professor of Applied Physics.  
 University Professor of Radiophysics and Electronics.  
 Sri N. Sarkar.  
 Sri Devaprasad Ghosh.

- (48) Committee appointed to consider the question of establishing a Central Drug Store and a hospital exclusively for students, etc., etc. :

Sri Kshirodchandra Chaudhuri.  
 Sri Bidhubhushan Ghosh.  
 Sri Nandakisor Ghosh.

- (49) Committee appointed to consider changes in the Regulations relating to Alternative English :

The Vice-Chancellor.  
 Prof. P. N. Banerjee.  
 Dr. P. C. Lahiri.  
 Sri Gopal Halder.  
 Prof. S. K. Mitra.  
 Sri B. B. Ghosh.

- (50) Committee appointed to consider the question of publication of the second volume of "One Hundred Years of the University of Calcutta" :

The Vice-Chancellor.  
 The Treasurer.  
 Prof. P. N. Banerjee.

- (51) \*Committee appointed to consider the applications for the post of the Estate and Development Officer :

The Vice-Chancellor.  
 The Treasurer.  
 Prof. Pramathanath Banerjee.  
 Sri Kalidas Ray.

- (52) \*Special Committee for the appointment of Professor Bidhubhushan Roy Memorial Lecturer for 1957 :

The Vice-Chancellor.  
 The Vice-President, Council of the University College of Science.  
 The Palit Professor of Physics.  
 The Ghose Professor of Pure Physics.  
 The Ghose Professor of Applied Physics.  
 The Ghose Professor of Applied Mathematics.  
 The Guruprasad Singh Professor of Physics.  
 Dr. Satyendranath Bose.

## Appendix H.

### Delegates and Representatives

Names of Delegates and Representatives	Conference or Organisations
Dr. Adharchandra Das	Second Annual Conference and Seminar on the "Study of the Great Religions" held at Dharwar.
Sri Arunkumar Sen	Meeting of the representatives of Commerce Faculties held in Madras under the auspices of the Inter-University Board.
Prof. Bireschandra Guba } Sri Ajitsankar Bhaduri } Dr. Rashbehari Das ..	Ninth Annual General Meeting of Indian Institute of Chemical Engineers held in Calcutta.
Sri K. K. Mookerjee ..	31st Session of the Indian Philosophical Congress held at Annamalaiagar.
Sri Karunes Bandyopadhyay .	31st Session of the All-India Educational Conference held at Jaipur.
Prof. N. K. Sinha .	Second Congress on Theoretical and Applied Mechanics (India) held at National Physical Laboratory, New Delhi.
Dr. Bijanbihari Bhattacharyya	Seminars on "Encounters between civilisation" held in the Indian School of International Studies, New Delhi.
Prof. P. N. Banerjee .	All-India Bengali Literary Conference held at Agra.
Prof. N. R. Sen .	General Council and State Faculty of Homoeopathic Medicine.
Dr. P. K. Chaudhuri .	22nd Annual Conference of Indian Mathematical Society.
Prof. S. K. Basu .	Symposium on High Polymers held by the National Chemical Laboratory of India at Poona.
	10th All-India Commerce Conference held at Ranchi.
	17th All-India Agricultural Economics Conference held at Cuttack.
Prof. S. P. Chatterjee } Dr. B. N. Mukherjee } Sri N. K. Basu } Dr. Mrs. M. Guba } Dr. Ranajit Lahiri } Sri K. Bagchi } Sri D. R. Mitra }	4th Annual General Meeting of the Indian Council of Geography held at Calcutta.
Prof. Miss A. G. Stock	7th Session of the All-India English Teachers' Conference held at Dharwar.
Sri N. K. Ghosh	Centenary Celebrations of the Madras University. Annual Meeting of the Inter-University Sports Board held at Waltair. Governing Body of the I.F.A.

Prof. J. P. Niyogi	39th Annual Conference of the Indian Economics Association.
Sri P. K. Ghosh	14th International Tuberculosis Conference held in New Delhi.
Sri Ramaprasad Mookerjee	Board of Trustees of the Indian Museum
Prof. Asutosh Bhattacharyya	5th session of the Sanskrit Visva Parishad held at Kurukshetra.
Dr. K. K. Bagchi	Health Congress conducted by the Royal Society of Health at Folkestone.
Prof. B. C. Guha	International Symposium on Enzyme Chemistry held in Tokyo and Kyoto.
Dr. Subodh Mitra } Dr. Susilkumar Basu }	Governing Body of the Institute of Post-Graduate Medical Studies.
Sri Kalisankar Gupta	Seminar on Teaching of Social Studies conducted by the All-India Council for Secondary Education.
Dr. S. P. Sen	Historical Conference in London organised by the School of Oriental and African Studies, University of London.
	Preliminary Meeting of the History of South-East Asia Conference held in Penang.
Sri N. K. Sidhanta } Prof. J. P. Niyogi } Prof. B. C. Guha } Prof. S. P. Chatterjee } Sri K. K. Mookerjee }	Regional Conference on the proposed introduction of General Education Courses in the Universities.
Prof. S. P. Chatterjee	Commission on National Atlases by the International Geographical Union.
Sri Parimal Bose	11th Bengal Library Conference held at Purulia.
Prof. Suniti Chatterjee } Prof. S. B. Dasgupta } Sri Gopal Haldar }	General Council of Sahitya Academy, New Delhi.
Prof. P. K. Sen	First Research Workers' Conference in Agriculture and Animal Husbandry in New Delhi.
Prof. S. P. Chatterjee } Prof. J. P. Niyogi }	Joint Committee to undertake a diagnostic survey of the Damodar Valley area.
Dr. Sukumar Ray	Anglo-American Conference of Historians held in London.
Prof. S. C. Chatterjee	32nd Session of the Indian Philosophical Congress held at Srinagar.

## Appendix I Examinations

### INTERMEDIATE EXAMINATION IN ARTS, 1957

The number of candidates registered for the Intermediate Examination in Arts, held in February, 1957, was 24,476 of whom 10,710 passed, 12,676 failed, 991 were absent and 99 were expelled. Of the successful candidates 1,058 were placed in the First Division, 4,878 in the Second Division, 4,779 in the Third Division. Of the total number registered 5,890 were female candidates, of whom 330 were placed in the First Division, 1,171 in the Second Division and 1,147 in the Third Division. Of the unsuccessful candidates 10,446 failed in English, 3,638 in Vernacular Languages, 337 in Second Languages, 2,712 in History, 1,618 in Logic, 126 in Mathematics, 3,429 in Elements of Civics, 2,817 in Commercial Geography, 1,253 in Commercial Arithmetic and Book-keeping, 1 in Chemistry, 112 in Botany, 7 in Geography, 13 in Junior Military Science and 75 in the Aggregate.

†Also 161 candidates appeared in special subject or subjects of whom 128 passed.

Years	Number of Candidates	Number Passed	Percentage of Passes*
1956	21,716	10,891	51.1
1957	24,476	10,710	45.6

\* Shows the percentage of passes on the actual number of students sitting for the examination, excluding those who were absent.

#### Female

†Of these 3 candidates appeared in English only of whom 1 passed.

" "	5	"	"	Bengali	and passed.
" "	1	candidate	"	Geography	" "
" "	2	candidates	"	Logic	" "
" "	2	"	"	Hist. & Geog.	" "
" "	1	candidate	"	History only	" "
" "	1	"	"	Arithmetic	" "
" "	1	"	"	Com. Geog.	and failed-

#### Male

Of these 66 candidates appeared in Bengali only of whom 59 passed,

" "	7	candidates	"	English	" "	3	"
" "	5	"	"	Eng. & Beng.	" "	2	"
" "	2	"	"	Eng. & Civics	" "	1	"
" "	1	candidate	"	Beng. & Cg	and passed.		
" "	24	candidates	"	Com. Geog.	of whom 20 passed.		
" "	19	"	"	History	" "	14	"
" "	3	"	"	Logic	and passed.		
" "	3	"	"	Bengali and History	and passed.		
" "	4	"	"	Sanskrit	of whom 2 passed.		
" "	2	"	"	Bengali and Sanskrit	and passed.		
" "	4	"	"	Civics	of whom 2 passed.		
" "	1	candidate	"	Arabic	and passed.		
" "	2	candidates	"	Mathematics	and passed.		
" "	1	candidate	"	Eng. & Math.	and passed in Math. only.		

The following table shows the number of students taking up different subjects at the I.A. Examination, 1957, the number passed and the percentage of passes :—

Subjects	Number of candidates	Number passed	Percentage of passes*
English ..	24,476	19,030	55.4
History ...	12,404	10,692	66.2
Logic ..	6,719	5,101	75.9
Mathematics ...	582	456	78.3
Elements of Civics ...	22,675	19,246	84.9
Commercial Geography ...	15,338	12,521	81.4
Commercial Arithmetic and Book-keeping	8,405	7,152	85.1
Botany ...	309	197	63.7
Geography ...	106	99	93.4
Biology ...	6	4	66.6

\* Shows the percentage of passes on the actual number of candidates sitting for the examination, excluding those who were absent.

The following is a statement of the number of candidates who failed in one subject only :—

English	... 4,329
Vernacular Languages	... 518
Second Languages	... 199
History	... 354
Logic	... 484
Elements of Civics	... 250
Commercial Geography	... 342
Commercial Arithmetic and Book-keeping	... 393
Mathematics	... 21
Botany	... 15

The following is a classification of the candidates, according to the places at which they were examined, and the Classical Languages taken up by them :—

Centres	No. of Candidates	SECOND LANGUAGES								
		Sanskrit	Pali	Arabic	Persian	Alternative Bengali	Alternative Hindi	Alternative Urdu	Latin	French Ita.
Agartala	291	31	...	...	...	9	1	...	...	...
Amta	116	1	...	...	...	1	...	...	...	...
Arambag	74	32	...	...	...	...	...	...	...	...
Asansol	293	38	...	...	2	4	...	...	...	...
Balurghat	156	22	...	...	...	...	...	...	...	...
Bangaon	243	23	...	...	...	5	...	...	...	...
Bankura	208	62	...	...	...	3	...	...	...	...
Barasat	76	24	...	...	...	...	...	...	...	...
Barisha	152	21	...	...	...	1	...	...	...	...
Barrackpore	149	22	...	...	...	3	...	...	...	...
Basirhat	224	24	...	1	...	2	...	...	...	...
Belur	28	15	...	...	...	1	...	...	...	...
Berhampur	293	67	...	...	...	...	...	...	...	...
Birbhum	166	43	...	...	...	2	...	...	...	...
Bishnupur	129	32	...	...	...	...	...	...	...	...
Bolpur	85	38	...	...	...	1	...	...	...	...
Burdwan	491	96	...	1	...	3	...	...	...	...
Calcutta	18,646	1,192	13	8	38	306	32	22	128	1
Chandernagore	187	32	...	...	...	1	...	...	7	...
Contai	299	87	...	...	...	22	...	...	...	...
Cooch-Behar	210	41	...	...	...	...	...	...	...	...
Darjeeling	134	8	...	...	...	...	...	...	8	...
Diamond Harbour	261	35	...	...	...	1	...	...	...	...
Garbeta	95	15	...	...	...	...	...	...	...	...
Gohardanga	252	29	...	...	...	5	...	...	...	...
Hetampur	66	32	...	...	...	...	...	...	...	...
Howrah	799	102	...	...	1	11	...	...	...	...
Hughli	212	34	...	...	...	11	...	...	2	...

Centres	No. of candidates	SECOND LANGUAGES									
		Sanskrit	Pali	Arabic	Persian	Alternative Bengali	Alternative Hindi	Alternative Urdu	Latin	French	Its.
Itachuna	109	45	...	...	...	5	...	...	...	...	...
Jaipalguri	262	34	...	...	...	15	...	...	...	...	...
Jangipur	133	2	...	...	...	...	...	...	...	...	...
Jhargram	55	31	...	...	...	...	...	...	...	...	...
Jiaganj	80	19	...	...	...	...	...	...	...	...	...
Kailasahar	54	9	...	...	...	1	...	...	...	...	...
Kalimpong	46	...	...	...	...	1	11	...	...	...	...
Kalna	118	17	...	...	...	1	...	...	...	...	...
Kandi	96	17	...	...	...	...	...	...	...	...	...
Katwa	177	39	...	...	...	...	...	...	...	...	...
Kharagpur	159	18	...	...	...	...	...	...	...	...	...
Krishnagar	278	38	...	...	...	9	...	...	...	...	...
Mahisadal	315	58	...	...	...	4	...	...	...	...	...
Malda	217	38	...	5	...	1	...	14	...	...	...
Midnapur	197	50	...	...	...	3	...	...	...	...	...
Nabadwip	225	52	...	...	...	...	...	...	...	...	...
Naihati	688	43	...	...	...	26	...	...	...	...	...
Raiganj	119	15	...	...	...	...	...	...	...	...	...
Rampurhat	146	42	...	...	...	5	...	...	...	...	...
Ranaghat	211	26	...	...	...	1	...	...	...	...	...
Santipur	105	23	...	...	...	...	...	...	...	...	...
Seratapur	264	58	...	...	...	2	...	...	...	...	...
Siliguri	105	35	...	...	...	...	...	...	...	...	...
Syamsundar	68	13	...	...	...	1	...	...	...	...	...
Taki	40	20	...	...	...	...	...	...	...	...	...
Tamluk	233	45	...	...	...	...	...	...	...	...	...
Uluberia	242	18	...	...	...	1	...	...	...	...	...
Uttarpara	342	44	...	...	...	1	...	...	...	...	...

The following table shows the percentage of passes in the various Vernacular Languages taken up by the candidates at the I.A. Examination in 1957 :—

Vernacular Languages	Number of candidates	Number passed	Percentage of Passes*
Alternative Paper in English ...	187	125	91.2
Bengali ...	22,142	17,612	83.2
Addl. Alternative Paper in Bengali.	469	412	96.5
Hindi ...	1,021	1,008	98.5
Addl. Alternative Paper in Hindi ...	44	29	93.6
Uriya ...	111	77	95
Assamese ...	6	6	100
Urdu ...	128	118	92
Addl. Alternative Paper in Urdu ...	22	22	100
Maithili ...	1	1	100
Modern Tibetan ...	4	4	100
Gujrati ...	68	61	89.7
Tamil ...	78	77	98.8
Telugu ...	9	9	100
Kanarese ...	4	4	100
Khasi ...	1	1	100
Malayalam ...	59	59	100
Nepali ...	113	111	98.2
Gurumukhi ...	5	5	100
Sindhi ...	4	4	100
<b>TOTAL ...</b>	<b>24,476</b>	<b>19,745</b>	<b>80.6</b>

\* Shows the percentage of passes on the actual number of students sitting for the examination, excluding those who were absent.

The following table shows the percentage of passes in the various Classical Languages taken up by the candidates at the I.A. Examination, 1957 :—

Classical Languages	Number of candidates	Number passed	Percentage of Passes*
Sanskrit ...	2,836	2,541	89.5
Pali ...	13	13	100
Arabic ...	15	15	100
Persian ...	41	40	97.5
Latin ...	9	9	100
French ...	37	37	100
Alternative Paper in Bengali ...	469	435	92.7
Do. Hindi ...	44	36	82
Do. Urdu ...	36	36	100
<b>TOTAL ...</b>	<b>3,500</b>	<b>3,162</b>	<b>90.3</b>

\* Shows the percentage of passes on the actual number of students sitting for the examination, excluding those who were absent.



# INTERMEDIATE EXAMINATION IN ARTS, 1957

Comparative table showing the number of candidates sent up from each Institution, the number passed, the number failed to obtain the minimum marks allotted to each separate subject or the passing marks in the aggregate, and the percentage of successful candidates :—

NAMES OF INSTITUTIONS	No. of candidates			FAILED IN																	Percentage of successful candidates	REMARKS	
				PASSED IN THE																			
	First Division	Second Division	Third Division	English	Veracular Languages	Second Languages	History	Logic	Mathematics	Elements of Civics	Commercial Geography	Commercial Arithmetic	Physics	Chemistry	Botany	Geography	Zoology	M. Sc	Aggregate	Absent			Expelled
Agartala Maharaja Bir Bikram College (1)	196	241	62	67	46	1	4	12	18	15	19	...	...	...	1	...	...	...	...	...	...	...	55.9
Aharbelma Syamsundar College	43	118	11	12	7	1	2	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	69.5
Amta Ramsaday College (2)	78	213	23	33	12	..	6	1	6	14	6	...	...	...	...	...	...	...	...	...	...	...	48.7
Arambagh Netaji Mahavidyalaya	42	113	10	16	6	1	...	4	2	4	1	...	...	...	...	...	...	...	...	...	...	...	57.1
Aransoi College	129	413	25	63	18	..	2	14	113	20	32	...	...	...	...	...	...	...	...	2	...	...	33
Arsol Manimala Girls' College	58	729	513	1	...	...	1	11	...	...	...	...	...	...	4	...	...	...	...	...	...	...	70.7





City College (7)	2751	319	366	433	533	12	71	30	537	417	312	...	25	...	5	...	7	17	10	1	44	4
Conrai P. K. College (8)	...	23	21	124	34	1	5	22	...	16	1	...	...	...	...	...	...	2	1	...	55	4
Cooch-Bihar Victoria College (9)	...	145	934	31	50	20	2	25	28	127	...	...	...	...	...	...	...	1	...	...	51	4
Darjeeling Govt. College (10)	...	53	4	9	23	10	2	1	7	8	...	...	...	...	...	...	...	1	...	...	60	2
Darjeeling St. Joseph's College (11)	...	33	513	8	2	1	...	1	...	...	3	2	...	...	...	...	...	1	...	...	81	3
Deshbandhu College for Girls	...	41	4	5	32	8	1	5	8	...	3	9	...	...	...	...	...	...	...	...	21	9
Diamond Harbour Fakirchand College (12)	...	158	417	38	79	26	2	19	23	150	16	6	...	...	...	...	...	...	...	...	37	3
Dum Dum Motijheel College (13)	...	130	935	24	63	8	7	6	9	...	16	5	2	...	...	...	...	2	...	...	47	7
Garbeta College (14)	...	6	318	15	25	...	7	...	...	...	312	1	...	...	...	...	1	1	...	...	57	1
Gobardanga Hindu College (15)	...	217	12	32	22	2	33	...	54	9	140	46	11	...	...	...	2	2	...	...	3	7

- (1) Of these, 5 were female candidates, of whom 1 passed in the 2nd Division, 3 passed in the 2nd Division, 3 passed in the 1st and 2 in the 3rd Division.
- (2) " 7 " " " 3 passed in the 1st and 2 in the 3rd Division.
- (3) " 8 " " " 1 passed in the 1st, 2 in the 2nd and 5 in the 3rd Division.
- (4) " 21 " " " 5 passed in the 1st, 21 in the 2nd and 8 in the 3rd Division.
- (5) " 48 " " " 2 passed in the 1st, 9 in the 2nd and 16 in the 3rd Division.
- (6) " 76 " " " 7 passed in the 1st, 42 in the 2nd and 57 in the 3rd Division.
- (7) " 281 " " " 3 passed in the 1st, 7 in the 2nd and 4 in the 3rd Division.
- (8) " 27 " " " 5 passed in the 1st, 7 in the 2nd and 8 in the 3rd Division.
- (9) " 39 " " " 2 passed in the 1st, 7 in the 2nd and 9 in the 3rd Division.
- (10) " 23 " " " 1 passed in the 1st, 2 in the 2nd and 1 in the 3rd Division.
- (11) " 6 " " " 1 passed in the 1st, 1 in the 2nd and 10 in the 3rd Division.
- (12) " 21 " " " 3 passed in the 1st, 10 in the 2nd and 16 in the 3rd Division.
- (13) " 70 " " " and all failed.
- (14) " 2 " " " 3 passed in the 2nd and 3 in the 3rd Division.
- (15) " 27 " " " 3 passed in the 2nd and 3 in the 3rd Division.

NAMES OF INSTITUTIONS	No. of candidates			PASSED IN THE		FAILED IN														REMARKS				
	First Division	Second Division	Third Division	English	Vernacular Languages	Second Languages	History	Logic	Mathematics	Elements of Civics	Commercial Geography	Commercial Arithmetic	Physics	Chemistry	Botany	Geography	Zoology	Anthropology	Aggregate		Absent	Expelled	Admission cancelled	Percentage of successful candidates
Gokhale Memorial Girls' College	49	520	16	4	..	1	2	1	..	..	3	..	..	..	..	..	..	..	..	..	..	..	83.7	
Hetampur K. C. College	53	419	16	14	8	3	1	2	1	2	..	..	..	..	..	..	..	..	..	..	..	..	71.7	
Howrah Girls' College	190	1932	62	69	23	5	24	19	..	7	9	..	..	..	..	..	..	..	..	1	..	..	59.8	
Howrah Narasinha Datta College (1)	199	737	56	85	38	..	8	16	..	34	30	19	..	..	..	..	..	..	..	1	..	..	50.6	
Hughli Mohsin College (2)	96	1235	20	20	12	..	..	6	1	4	6	4	..	..	..	..	..	..	..	1	..	..	70.6	
Hughli Women's College	41	626	7	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	92.7	
Itachunda B. N.	76	732	14	16	7	2	6	1	..	3	..	..	..	..	..	..	..	..	..	1	..	..	68	
Jalpaiguri A. C. (3)	168	326	44	60	37	3	9	14	13	1	21	17	..	..	..	..	..	..	2	1	6	..	43.7	
Jalpaiguri Prasanna Deb Baika Vidyalaya	56	619	18	8	2	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	96.8	

Jangipur College (4)	...	106	5	25	15	56	18	...	10	3	...	22	11	1	...	...	...	...	...	42.5
Jhargram Raj College (5)	...	24	2	8	4	8	1	5	2	...	2	4	...	...	...	...	...	...	...	58.3
Jiaganj Stripat Singh College (6)	...	62	3	30	7	19	6	...	...	...	1	2	...	...	...	...	1	...	...	64.5
Kailashar R. K. Mission (7)	...	37	2	6	7	22	14	...	2	...	3	2	2	...	...	...	...	...	...	40.5
Kalimpur S. U. M. College (8)	.	33	...	9	12	11	1	...	13	11	4	...	...	...	...	...	...	...	...	60.6
Kalna College (9)	...	86	10	18	3	45	5	3	1	5	...	1	6	7	...	...	...	...	1	43.5
Kandi Raj College (10)	...	60	...	22	17	15	6	...	7	...	15	...	...	...	...	...	...	...	...	65
Katwa College (11)	...	144	..	22	19	33	43	3	25	22	...	27	29	8	...	...	...	...	1	28.7
Khatargpur College (12)	...	116	8	29	42	16	12	2	8	7	...	8	...	7	...	...	...	...	1	68.1
Krishnagar College (13)	...	187	14	50	52	48	21	1	7	8	1	17	15	3	...	...	...	...	3	62.4
Lady Brabourne College	...	197	41	73	6	14	...	...	...	...	...	1	...	...	1	...	...	...	1	88.4

- (1) Of these, 14 were female candidates, of whom 2 passed in the 2nd and 1 in the 3rd Division.  
 (2) " 5 were female candidates, of whom 2 passed in the 2nd and 1 in the 3rd Division.  
 (3) " 12 were female candidates, of whom 3 passed in the 2nd and 4 in the 3rd Division.  
 (4) " 6 were female candidates, of whom 2 passed in the 2nd Division.  
 (5) " 10 were female candidates, of whom 5 passed in the 2nd, and 1 in the 3rd Division.  
 (6) " 3 were female candidates, of whom 1 passed in the 2nd Division.  
 (7) " 3 were female candidates and all failed.  
 (8) " 7 were female candidates, of whom 4 passed in the 2nd and 2 in the 3rd Division.  
 (9) " 9 were female candidates, of whom 4 passed in the 1st, 1 in the 2nd and 1 in the 3rd Division.  
 (10) " 3 were female candidates, of whom 2 passed in the 2nd Division.  
 (11) " 9 were female candidates, of whom 3 passed in the 2nd Division.  
 (12) " 21 were female candidates, of whom 5 passed in the 2nd and 7 in the 3rd Division.  
 (13) " 65 were female candidates, of whom 5 passed in the 1st, 16 in the 2nd and 16 in the 3rd Division.

NAMES OF INSTITUTIONS	No. of Candidates		FAILED IN																PASSED IN THE		REMARKS			
	First Division	Second Division	Third Division	English	Vernacular Languages	Second Languages	History	Logic	Mathematics	Elements of Civics	Commercial Geography	Commercial Arithmetic	Physics	Chemistry	Botany	Geography	Zoology	Anthropology	Aggregate	Absent		Expelled	Admission Cancelled	Percentage of successful candidates
Loreto College .	54	15	26	8	2	2	...	2	1	...	107	111	55	...	...	...	...	...	...	...	...	...	...	90.7
Maharaja M. C. College (1)	638	15	93	114	297	96	9	55	45	...	...	111	55	...	13	...	...	...	...	...	9	...	...	40
Maharaja Udaychand Womens' College	50	9	17	10	11	5	...	1	1	...	4	4	...	...	...	...	...	...	...	...	...	...	...	72
Mahisadal Raj College (2)	205	14	61	43	72	34	...	18	5	4	25	15	4	...	...	...	...	...	...	4	3	2	...	58.4
Malda College (3)	133	11	22	26	63	24	1	4	6	1	19	14	3	...	...	...	...	...	...	...	...	...	...	44.3
Midnapur College (4)	108	6	36	35	20	8	...	11	17	...	4	...	...	...	...	...	...	...	...	...	1	...	...	72
Muralidhar Girls' College	304	1	32	53	23	71	7	35	30	...	43	28	...	...	22	...	...	...	...	...	2	...	...	21.8
Netadwip Vidyasagar College (5)	154	11	29	30	74	9	15	3	...	21	14	8	...	...	...	...	...	...	...	...	2	2	...	46

## Naihati Riabi Bankimchandra College (6)

...	532	23	141	137	178	74	11	14	29	...	31	54	27	...	...	...	6	10	...	57'3
...	68	52	13	...	...	...	...	1	...	...	...	...	...	...	...	...	1	1	...	97
...	96	5	21	14	43	26	2	8	5	...	17	28	5	...	...	...	1	...	...	42
...	88	5	17	15	50	11	...	13	5	1	4	2	2	...	...	...	1	...	...	40'2
...	76	6	27	15	21	6	6	3	4	...	3	...	...	...	...	...	...	...	...	63'1
...	24	8	8	5	2	...	...	...	2	2	3	1	...	...	...	...	1	...	...	91'3
...	76	7	15	12	37	2	2	8	3	...	7	3	...	...	...	...	...	...	...	44'7
...	197	20	64	49	40	12	1	24	25	4	24	18	1	...	...	...	...	...	...	67'5
...	139	6	1	35	2	15	1	1	3	1	7	8	8	...	...	...	...	...	...	63
...	188	11	70	38	52	29	...	5	5	1	9	26	11	...	...	...	1	2	1	64
...	14	2	2	1	7	1	1	1	6	...	2	...	...	...	...	...	...	...	...	38'4
...	140	10	12	34	17	5	...	...	...	...	7	3	2	...	...	...	1	...	...	61'9

## Seth Soorajmull Jalan Girls' College

## Sibpur Dinabandhu Institution

- (1) Of these, 259 were female candidates, of whom 5 passed in the 1st, 34 in the 2nd and 65 in the 3rd Division.
- (2) " 4 2 passed in the 1st Division.
- (3) " 25 3 passed in the 1st, 7 in the 2nd and 3 in the 3rd Division.
- (4) " 29 2 passed in the 1st, 10 in the 2nd and 8 in the 3rd Division.
- (5) " 34 4 passed in the 1st, 4 in the 2nd and 7 in the 3rd Division.
- (6) " 126 10 passed in the 1st, 30 in the 2nd and 35 in the 3rd Division.
- (7) " 32 9 passed in the 2nd and 4 in the 3rd Division.
- (8) " 34 1 passed in the 1st, 12 in the 2nd and 6 in the 3rd Division.
- (9) " 21 3 passed in the 1st, 2 in the 2nd and 6 in the 3rd Division.
- (10) " 74 4 passed in the 1st, 23 in the 2nd and 23 in the 3rd Division.
- (11) " 39 13 passed in the 2nd and 13 in the 3rd Division.



NAMES OF INSTITUTIONS	No. of candidates	PASSED IN THE			FAILED IN																	Percentage of successful candidates	REMARKS				
		First Division	Second Division	Third Division	English	Vernacular Languages	Second Languages	History	Logic	Mathematics	Elements of Civics	Commercial Geography	Commercial Arithmetic	Physics	Chemistry	Botany	Geography	Zoology	M. Sc.	Aggregate	Absent			Expelled	Admission cancelled		
Siliguri College (1,	...	42	1	11	5	8	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	40.4	
Sonada Salesian College	...	8	4	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100	
South Calcutta Girls' College	...	135	1	19	14	85	21	2	32	17	...	10	20	...	...	...	14	...	...	...	...	3	...	...	...	25.7	
Sri Sikshyatan	...	30	8	6	5	11	...	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	63.3	
St. Raul's College	...	51	6	19	15	6	2	3	1	5	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	78.4	
St. Xavier's College	...	146	48	72	17	6	4	1	2	7	...	2	2	2	...	...	...	...	...	...	1	1	2	...	...	91.6	
Surendranath College (2)	...	910	19	130	612	514	81	83	110	2	...	120	109	112	...	...	...	...	...	...	...	10	12	1	...	34.9	
Sri Vidyasagar College (3)	...	114	11	41	1	50	18	...	2	16	2	2	4	6	...	...	...	4	...	...	...	...	...	3	...	57	



## INTERMEDIATE EXAMINATION IN SCIENCE, 1957

The number of candidates registered for the Intermediate Examination in Science, held in February, 1957, was 14,567 of whom 6,913 passed, 7,33 failed, 212 were absent and 112 were expelled. Of the successful candidates, 1,991 were placed in the First Division, 3,336 in the Second Division and 1,586 in the Third Division. Of the total number registered 849 were female candidates, of whom 145 were placed in the First Division, 284 in the Second Division and 94 in the Third Division. Of the unsuccessful candidates 5,352 failed in English, 2,060 in Vernacular Languages, 3,603 in Chemistry, 3,317 in Mathematics, 2,742 in Physics, 17 in Botany, 1 in Geology, 1 in Geography and 1,114 in Biology.

† Also 252 candidates appeared in the special subject or subjects of whom 160 passed.

Year	Number of candidates	Number passed	Percentage of Passes*
1956	15,097	7,988	53.0
1957	14,567	6,913	49.2

\*Shows the percentage of passes on the actual number of candidates sitting for the examination excluding those who were absent.

†There were 252 candidates who appeared in special subjects at the I.Sc. Examination held in February, 1957 :—

*Male*

Of these 163 appeared in Mathematics only of whom 101 passed.

„ „	13	„ „	Physics	„ „ „	13	„
„ „	54	„ „	Biology	„ „ „	37	„
„ „	2	„ „	Zoology	„ „ „	2	„
„ „	1	„ „	Botany	and he passed,		

*Female*

Of these 9 appeared in Mathematics only of whom 2 passed.

„ „	3	„ „	Biology	and they passed.
„ „	1	„ „	Botany	and she passed.

The following table shows the number of candidates taking up different subjects at the I.Sc. Examination, 1957, the number passed, and the percentage of passes :—

Subject		Number of Candidates	Number Passed	Percentage of Passes*
English	...	14,567	8,891	61·0
Vernacular Languages	...	14,567	12,197	83·7
Chemistry	...	14,567	10,654	73·1
Mathematics	...	12,914	9,287	71·9
Physics	...	14,098	11,041	78·2
Botany	...	318	301	94·6
Physiology	...	8	8	100
Biology	...	6,634	5,520	83·2
Geography	...	96	95	98·9
Anthropology	...	28	27	96·4
Geology	...	95	94	98·9
Zoology	...	1	1	100·

The following is a statement of the number of candidates, who failed in one subject only :—

English	...	1,473
Vernacular Languages	...	401
Chemistry	...	315
Mathematics	...	1,539
Physics	...	414
Botany	...	175
Biology	...	663
M. Sc.	...	10

The following table shows the percentage of passes in the Vernacular Languages and the Alternative Paper in English taken up by the candidates at the I.Sc. Examination in 1967 :—

Vernacular Languages	Number of Candidates	Number Passed	Percentage of Passes*
Bengali ...	13,478	11,176	82.9
Hindi ...	644	595	92.3
Uriya ...	84	31	91.1
Assamese ...	2	2	100
Urdu ...	152	149	98
Nepali ...	32	31	96.8
Meitbili ...	1	1	100
Gujrathi ...	22	18	81.8
Tamil ...	29	29	100
Telugu ...	6	6	100
Gurumukhi ...	8	8	100
Malayalam ...	6	6	100
Sindhi ...	2	2	100
Alternative Paper in English	148	143	96.6
Manipuri ...	1	1	100
Modern Armenian ...	1	1	100
Kanarese ...	1	1	100
<b>TOTAL ...</b>	<b>14,567</b>	<b>12,197</b>	<b>95.2</b>

\* Shows the percentage of passes on the actual number of candidates sitting for the examination, excluding those who were absent.

The following table shows the number of candidates, examined at the centres noted against them at the I.Sc. Examination, 1957 :—

Name of Centres	Number of Candidates
Agartala	140
Amta	53
Arambagh	47
Asansol	317
Balurghat	65
Bongaon	115
Bankura	239
Barasat	50
Barisha	112
Belur	90
Berhampur	258
Birbhum	186
Bishnupur	142
Bolpur	88
Burdwan	359
Calcutta	8,774
Chandernagar	107
Contai	110
Cooch-Bihar	137
Darjeeling	84
Diamond Harbour	32
Garbeta	47
Gobardanga	143
Hetampur	71
Howrah	401
Hughli	111
Itachuna	96
Jalpaiguri	120
Jangipur	65
Jhargram	46
Jiaganj	37
Kailasahar	20
Kalna	61
Kandi	48
Katwa	72
Kharagpur	101
Krishnagar	116
Malda	89
Midnapur	136
Nabadwip	136
Naihati	191
Raiganj	53
Rampurhat	65
Ranaghat	84
Santipur	72
Serampur	144
Siliguri	56
Syamsunder	45
Taki	38
Tamluk	123
Uluberia	82
Uttarpara	193
<b>TOTAL</b>	<b>14,567</b>

# INTERMEDIATE EXAMINATION IN SCIENCE, 1957

Comparative Table showing the number of candidates sent up from each Institution, the number passed, the number failed to obtain the minimum marks allotted to each separate subject or the pass marks in the aggregate, and the percentage of successful candidates :—

NAMES OF INSTITUTIONS	PASSED IN THE												FAILED IN												Percentage of Passes	Absent	Expelled	Remarks
	First Division			Second Division			Third Division			Compulsory subjects						Additional subjects												
	English	Vernacular (Bengali)	Chemistry	Mathematics	Physics	Botany	Biology	Zoology	Geology	Geography	Physiology	Anthropology	Mathematics	Physics	Botany	Zoology	Geography	Biology	Aggregate									
Agartala Maharsja Bir Bikram College (1)	140	21	43	30	4	7	19	21	14	...	4	...	...	...	...	...	...	2	...	3	...	...	2	68.11				
Amta Ramsaday College	52	4	10	8	24	9	20	9	8	...	3	...	...	...	1	...	...	...	...	3	...	...	...	42.3				
Arambagh Netaji Mahavidyalaya	47	4	10	7	23	10	7	3	4	...	6	...	...	...	1	...	...	...	...	2	...	...	...	44.6				
Asansol College	236	20	87	62	70	26	37	63	27	16	...	...	...	...	2	...	...	...	...	16	...	...	3	57.6				
Asansol Manimala Girls' College	20	5	6	2	7	1	3	1	3	4	...	...	...	...	2	...	...	...	...	...	...	...	...	65				
Asutosh College (2)	858	141	205	93	287	107	128	155	86	14	...	...	...	...	6	...	9	...	...	...	...	...	9	59.8				





NAMES OF INSTITUTIONS	PASSED IN THE			FAILED IN																				Percentage of successful candidates									
	Number of candidates			Compulsory Subjects										Additional Subjects																			
				First Division Second Division Third Division										English Vernacular Languages Chemistry Mathematics Physics Botany Biology Zoology Geology Geography Physiology Anthropology Mathematics Physics Botany Zoology Geography Biology Aggregate M.C.																			
Burdwan Raj College (10)	34	27	41	48	179	80	160	107	113	10	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	18	...	1	7	88.3	
Central Calcutta College	50	41	21	...	2	...	1	1	2	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	7	...	2	7	89.5	
Chandernagore College (11)	105	18	33	38	354	16	11	4	1	5	...	...	...	1	...	...	...	...	3	2	1	...	...	...	...	...	...	2	...	1	...	61.5	
Charuchandra College (12)	543	16	70	78	286	87	205	135	132	27	...	...	...	...	...	...	...	...	15	1	...	1	30	...	...	...	...	...	13	...	11	7	30.8
City College (13)	534	47	23	6	217	75	191	135	131	31	...	...	...	...	...	...	...	...	20	10	12	...	...	...	...	...	...	12	...	11	2	41.3	
Contai P. K. College (14)	105	10	36	17	46	3	11	17	3	2	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	60
Cooch-Behar Victoria College (15)	136	1	36	19	16	31	39	28	26	16	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	1	...	1	1	45.9	
Darjeeling Government College	34	6	13	6	6	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	73.5
Darjeeling St. Joseph's College (16)...	46	21	15	1	3	3	1	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	82.2

[illegible]

(10) Of these 3 were female candidates of whom 1 passed in the First and 2 in the Second Division.

(11)	" 2 were "	" and they "	" First Division.
------	------------	--------------	-------------------

1	28 were	"	"	1	"	First, 5 in the Second and 8 in the Third Division
(12)	28 were	"	"	1	"	First, 5 in the Second and 8 in the Third Division

13	38 were	"	"	1	"	First, 6 in Second and 3 in the Third Division.
13	38 were	"	"	1	"	First, 6 in Second and 3 in the Third Division.

[illegible][illegible][illegible]

(17) " I was a female candidate and passed in the Second Division.

(18) 6 were female candidates and all failed.

(19) 10 were female candidates of whom 3 passed in the Second and 2 in the Third Division.

(20) „ 5 were „ of whom 2 passed in the First and 1 in the Second Division.

(R) " I  
8 " "  
I " "  
and I " "

"

NAMES OF INSTITUTIONS	PASSED IN THE		FAILED IN																REMARKS							
	Number of candidates			Compulsory Subjects								Additional Subjects														
	First Division	Second Division	Third Division	English	Vernacular (Bengali)	Chemistry	Mathematics	Physics	Botany	Biology	Zoology	Geology	Geography	Physiology	Anthropology	Mathematics	Physics	Botany		Zoology	Geography	Biology	Aggregate	M.C.		
Jangipur College (22)	65	817	1023	713	86	5	...	6	...	5	...	...	...	...	...	1	...	...	...	...	...	6	...	...	...	54.6
Jhargram Agricultural College	46	414	810	...	67	8	1	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	56.6
Jiaganj Sripat Singh College	37	28	221	1314	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	32.4
Kailasabar Ramkrishna Mahavidyalaya	20	...	11	3	5	1	2	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	70
Kalna College	72	38	1140	76	15	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	30.9
Kandi Raj College (23)	48	523	712	51	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	72.9
Katwa College (24)	72	...	2	358	1942	29	26	...	18	...	...	...	...	...	...	2	...	...	...	...	...	9	...	...	...	6.9
Kharagpur College (25)	99	1321	1542	510	16	7	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	49.4
Krishnagar College (26)	114	3746	812	24	5	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	79.8

Percentage of successful candidates

Absent  
Expelled

Lady Braburne College	...	100	57	38	3	3	1	3	2	2	...	3	...	...	...	...	...	...	98
Loreto House	...	17	7	7	...	...	...	4	1	1	...	...	...	2	...	...	...	82	
Maharaja M. C. College (27)	...	283	6	2	32	35	53	64	81	55	44	...	...	16	5	...	23	35	
Malda College (28)	...	89	230	19	34	4	4	15	11	...	...	...	...	...	...	...	1	57	
Midnapur College (29)	...	136	9	42	22	45	9	10	15	34	4	...	...	...	...	15	1	54	
Nabadwip Vidyasagar College	...	135	5	38	14	63	17	19	47	24	9	...	...	1	...	23	1	42	
Naihati Rishi B. C. College (30)	...	166	9	50	20	61	8	23	31	17	2	...	...	1	...	8	1	47	
Presidency College	...	181	2	4	...	...	...	2	2	2	...	...	...	1	...	...	...	97	
R. G. Kar Medical College	...	212	20	36	17	79	81	70	32	38	31	...	...	27	...	32	4	44	
Rajganj College	...	53	2	8	10	27	16	18	23	23	...	...	...	...	...	...	...	37	
Rampurhat College	...	66	2	18	7	32	10	7	16	7	...	...	...	...	...	3	1	41	
Ranaghat College (31)	...	82	3	20	8	12	35	20	25	14	...	...	...	...	...	...	...	37	

(22) Of these 2 were female candidates and they failed.

- (23) 1 was a female candidate and she passed in the Second Division.  
 (24) " 1 was a " Third  
 (25) " candidates of whom 1 passed in the Second Division.  
 (26) " 2 were " 2 passed in the First, 3 in the Second and 1 in the Third Division.  
 (27) " 6 were " 7 passed in the Second and 2 in the Third Division.  
 (28) " 23 were " candidate and she failed.  
 (29) " 1 was a " candidates of whom 1 passed in the First and 1 in the Second Division.  
 (30) " 6 were " of whom 1 passed in the First, 2 in the Second and 2 in the Third Division.  
 (31) " 8 were " candidate and she failed.  
 (32) " 1 was a "

# **NAMES OF INSTITUTIONS**

NAMES OF INSTITUTIONS	PASSED IN THE			FAILED IN																Percentage of successful candidates	Absent	Expelled	REMARKS						
	First Division	Second Division	Third Division	Compulsory Subjects																				Additional Subjects					
				English	Vernacular (Bengali)	Chemistry	Mathematics	Physics	Botany	Biology	Zoology	Geology	Geography	Physiology	Anthropology	Mathematics	Physics	Botany	Zoology					Mc.	Geography	Biology	Aggregate		
...	73	21	10	41	29	12	11	17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	35.6	...	...	...
Santipur College	319	96	125	38	42	11	24	26	17	9	...	...	...	...	...	10	...	...	...	2	...	68	...	...	...	78.2	7	...	...
Scottish Church College (32)	13	32	41	11	8	28	12	33	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60.4	...	...	...
Serampur College (33)	163	24	40	29	52	0	30	3	18	6	...	...	...	...	...	1	...	...	...	...	...	15	...	...	...	58.1	2	...	...
Seth Anandram J. College	14	26	39	22	43	24	15	15	6	5	...	...	...	...	...	1	...	...	...	...	...	14	...	...	...	63.5	3	...	...
Sibpur Dinabandhu College	56	4	8	2	36	8	22	26	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	95.4	1	1	...
Siliguri College	18	7	6	...	1	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	72.2	...	...	...
St. Joseph's College	135	62	47	6	12	2	5	2	...	4	...	...	...	...	...	...	...	4	...	...	...	10	...	...	...	85.1	...	...	...
St. Paul's College	271	192	60	2	5	4	3	4	...	...	...	...	...	...	...	...	...	...	...	1	...	9	...	...	...	94.4	2	...	...
St. Xavier's College	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...



## B.A. EXAMINATION, 1957

The number of candidates registered for the B.A. Examination, held in April, 1957, was 9,157 of whom 3,636 passed, 5,071 failed, 450 were absent, and 14 were expelled. Of the successful candidates 3,043 were placed in the Pass list, 56 passed with Distinction and 537 passed with Honours; 17 were placed in the First Class and 520 in the Second Class. Of the total number registered 2,174 were female candidates, of whom 5 were placed in the First Class, 195 in the Second Class, 18 passed with Distinction and 1,108 were placed in the Pass list. Of the unsuccessful candidates, 5,373 failed in English, 1,477 in Vernacular Languages, 348 in Second Languages, 2,310 in History, 2,108 in Economics, 334 in Philosophy, 203 in Mathematics, 2 in Education, 9 in Botany, 19 in Geography and 567 in the aggregate.

†Also 225 candidates appeared in special subject or subjects of whom 133 passed.

Years	Number of Candidates	Number Passed	Percentage of Passes*
1956	6,920	3,026	45.7
1957	9,157	3,636	42.

## Females

†Of these 23 appeared in Bengali Honours of whom 19 passed.

3	Sanskrit	2
6	History	1
4	Economics	1
4	Philosophy	1
2	Botany	2
1	English and was unsuccessful.	
1	English and Bengali and passed	

## Male

Of these 79 appeared in English and Bengali of whom 42 passed.

2	English and Hindi and were successful.	
1	Mathematics and was successful.	
26	Economics of whom 11 passed	
5	English, Bengali and Economics of whom 4 passed,	
28	Bengali of whom 24 passed.	
10	History " 7 "	
18	English " 5 "	
1	Indian History of whom 1 passed.	
5	Sanskrit of whom 4 passed.	
1	English, Hindi and History of whom 1 passed.	
3	Philosophy of whom 2 passed.	
1	Ancient History of whom 1 passed.	
1	English, Bengali and French of whom 1 passed.	

The following table shows the percentage of passes in the various Vernacular Languages taken up by the candidates at the B.A. Examination, 1967 :—

Vernacular Languages	Number of candidates	Number Passed	Percentage of Passes*
Bengali ...	7,403	6,086	82.2
Addl. Alternative Bengali ...	1,140	1,101	96.5
Hindi ...	298	18	93.9
Addl. Alternative Hindi ...	34	31	91.2
Urdu ...	36	34	95
Addl. Alternative Urdu ...	30	29	96.6
Uriya ...	9	9	100
Assamese ...	4	4	100
Gujrathi ...	7	7	100
Tamil ...	30	29	96.6
Telugu ...	4	3	75
Malayalam ...	8	7	87.5
Nepali ...	77	71	92.2
Modern Tibetan ...	2	2	100
Khasi ...	2	2	100
M nipurī ...	2	2	100
Advanced Paper in English ...	67	58	86.5
Sinhalese ...	4	4	100
TOTAL ...	9,157	7,497	81.7

\* Shows the percentage of passes on the actual number of candidates sitting for the examination excluding those who were absent.



The following table shows the percentage of passes in the Second Languages, Honours and Pass, taken up by the candidates at the B.A. Examination, 1957 :—

Second Languages	Honours			Pass		
	Number of Candidates	Number Passed	Percentage of Passes*	Number of Candidates	Number Passed	Percentage of Passes*
Sanskrit ...	48	31	64.5	1,078	852	78.9
Pali ...	1	1	100	11	11	100
Arabic ...	...	...	...	5	5	100
Persian ...	7	3	42.8	7	7	100
Latin ...	...	...	...	22	22	100
French ...	2	...	...	12	12	100
German ...	...	...	...	1	1	100
Alt. Bengali ...	249	133	53.4	893	772	...
Alt. Hindi ...	3	2	66.6	21	21	100
Alt. Urdu ...	10	2	20	19	18	78.9
TOTAL ..	220	172	53.7	2,069	1,721	83.1

\* Shows the percentage of passes on the actual number of candidates, sitting for the examination, excluding those who were absent.

The following is a statement of the number of candidates who failed in one subject only :—

English	... 1,207
Vernacular Languages	... 278
Second Languages	... 75
History	... 282
Economics	... 331
Philosophy	... 213
Mathematics	... 71

The following is a classification of the candidates, according to the places at which they were examined, and the Classical Languages taken up :—

[illegible]

Centre	Number of Candidates	SECOND LANGUAGES (Pass)									
		Sanskrit	Pali	Arabic	Persian	Latin	French	Alt. Bengali	Alt. Hindi	Alt. Urdu	German
Krishnagar	142	15	...	...	...	...	...	15	...	...	...
Mahisadal	102	21	...	...	...	...	...	28	...	...	...
Malda	117	15	...	...	...	...	...	2	...	...	...
Midnapur	175	36	...	...	...	...	...	6	...	...	...
Nabadwip	83	18	...	...	...	...	...	1	...	...	...
Naihati	122	13	...	...	...	...	...	16	...	...	...
Serampur	123	23	...	...	...	...	...	...	...	...	...
Raiganj	41	3	...	...	...	...	...	5	...	...	...
Tamluk	106	24	...	...	...	...	...	7	...	...	...
	9,157	1,078	11	5	7	22	12	898	21	19	1

The following table shows the number of candidates taking up different subjects at the B.A. Examination, 1956, Honours and Pass, the number passed and the percentage of passes :—

Subject	Honours			Pass		Percentage of passes
	Number of candidates	Number passed	Percentage of passes	Number of candidates	Number passed	
English ...	119	48	41	8,599	5,878	58
History ...	112	70	62.5	6,050	3,740	62
Ancient Indian and World History.	7	7	100	...	...	...
Islamic History & Culture	4	1	25	...	...	...
Economics ...	278	141	51.6	6,373	2,270	67.1
Philosophy ...	104	62	59.6	1,139	805	70.6
Mathematics ...	18	6	46.1	418	210	50.2
Linguistics ...	2	2	100	...	...	...
Botany ...	3	3	100	59	50	84
Anthropology ...	2	2	100	...	...	...
Geography ...	23	21	86.9	102	83	81.3
Statistics ...	3	2	66.7	...	...	...

# B.A. EXAMINATION, 1957

Comparative Table showing the number of candidates sent up from each Institution, the number passed, the number failed to obtain the minimum marks allotted to each separate subject or pass marks in the aggregate, and the percentage of successful candidates :—

Names of Institutions	Number of candidates	PASSED				FAILED IN										Absent	Expelled	Admission Cancelled	Percentage of successful candidates*		
		With Honours	2nd Class	Distinction	Without Honours	English	Vern. Languages	Second Languages	Linguistics	History	Islamic History	Economics	Philosophy	Mathematics	Science					Aggregate	
Agartala M. B. B. College	...	57	...	3	...	16	31	15	1	...	14	...	7	...	...	1	3	...	...	33.2	
Amta Ramsaday College	...	28	...	...	...	14	14	3	1	...	4	...	2	...	...	...	3	1	...	...	51.4
Asansol College (1)	...	90	...	1	...	45	29	6	...	...	12	...	16	1	...	...	10	2	...	...	52.3
Asutosh College (2)	...	558	...	47	2	176	203	56	15	...	74	...	111	37	11	9	40	15	...	...	41.3
Bangabasi College (3)	...	677	...	31	3	206	256	130	28	...	147	...	181	3	12	8	110	57	2	...	38.7
Balarghat College	...	59	...	...	...	21	27	11	...	...	15	...	7	...	...	...	6	3	...	...	37.5
Bankura Christian College (4)	...	72	...	3	...	37	21	8	1	...	4	...	15	4	2	...	5	1	...	...	56.4
Barhampore Girls' College	...	36	...	3	...	19	11	1	1	...	1	...	...	1	...	...	1	2	...	...	64.7

Berhampur K. N. College	...	121	...	2	...	53	42	23	3	...	23	...	27	3	2	...	...	45.6	
Bethune College	...	115	1	23	1	56	28	3	...	...	7	...	11	4	1	...	...	69.6	
Bishnupur Ramananda College (5)	...	40	...	...	...	2	14	1	...	...	7	...	11	...	...	...	...	50	
Burdwan Raj College (6)	...	101	...	2	1	39	32	8	6	...	24	...	24	...	3	...	11	4	43.3
Burdwan Maharaj Udaychand Women's College.	...	16	...	...	...	8	4	1	2	...	3	...	1	...	...	...	...	...	50
Bongson D. B. Mahavidyalaya (7)	...	45	...	...	...	14	25	8	...	...	13	...	12	2	1	...	...	...	31.1
Calcutta Women's College	...	28	...	...	...	8	11	1	2	...	3	...	4	3	...	...	...	...	34.8
Central Calcutta College	...	94	3	17	1	24	19	3	...	...	6	2	11	...	3	...	8	1	48.3
Chandernagar College (8)	...	56	...	1	...	27	20	6	4	...	8	...	15	...	...	...	7	...	50
Charuchandra College (9)	...	156	...	1	...	37	74	36	2	...	56	...	71	5	3	...	14	5	25.1
City College (10)	...	533	...	25	3	194	184	79	14	...	114	...	149	18	19	2	42	10	42.2
Contai P. K. College (11)	...	146	...	...	...	64	60	10	10	...	41	...	25	6	2	...	8	3	37.7
Cooch-Bihar Victoria College (12)	...	77	...	3	2	23	29	21	...	...	23	...	20	8	1	...	...	...	36.8

\* Shows the percentage of passes on the actual number of candidates, sitting for the examination, excluding those who offered special subjects and who were absent.

- (1) Of these 33 were female candidates of whom 1 was placed in the Second Class and 14 passed.  
 (2) " 372 " " 23 were " " " 3 in Distr. and 115 passed.  
 (3) " 47 " " 2 were " " " " 12 "  
 (4) " 16 " " 1 was " " " 8 "  
 (5) " 4 " " 1 passed in Pass Course  
 (6) " 7 " " candidates of whom 1 obtained Second class and 3 passed in Pass Course  
 (7) " 4 " " 1 passed in Pass Course.  
 (8) " 30 " " of whom 1 obtained Second Class and 12 passed in Pass Course.  
 (9) " 47 " " 1 " " " 13 "  
 (10) " 200 " " 2 " " " 3 Secured Distinction and 84 were placed in the Pass list.  
 (11) " 16 " " 7 were placed in the Pass list.  
 (12) " 19 " " 1 obtained Second Class and 5 were placed in the Pass list.



Jaganj Sripat Singh College (19) ...	30	...	...	1	10	16	12	...	...	5	1	...	...	...	1	...	...	36.7
Kailashar R. K. Mahavidyalaya (20)	17	...	...	...	6	9	3	...	...	4	2	...	...	...	...	1	...	37.5
Kahe College (21)	25	...	...	...	14	8	...	1	...	6	4	...	...	...	...	...	...	56.0
Krishnagar College (22)	97	...	...	7	33	44	22	2	...	23	6	...	...	...	...	2	...	49.3
Lady Brabourne College	104	3	42	2	46	1	...	...	1	1	1	...	...	...	...	5	...	95.9
Loreto House	27	1	9	2	14	...	...	...	...	...	...	...	...	...	...	...	...	96.4
Maharaja M. C. College (23)	292	...	6	...	95	119	58	12	...	86	90	7	1	...	25	8	...	35.6
Mahisadal Raj College (24)	53	...	...	...	25	18	13	3	...	15	7	...	...	...	2	1	...	48.0
Malda College (25)	89	...	...	1	32	45	26	1	...	12	19	5	...	...	4	3	...	38.3
Midnapur College (25)	62	...	4	...	16	27	5	2	...	12	14	2	...	...	8	2	...	33.3
Muralidhar Girls' College	167	...	8	...	50	63	24	3	...	30	41	15	...	...	12	8	...	32.2

\* Shows the percentage of Passes on the actual number of candidates sitting for the examination, excluding those who were absent.

(18) Of these, 18 were female candidates of whom 3 obtained Second Class and 7 were placed in the Pass Course.

(14) " " 2 " " and both of them were placed in the pass list.

(15) " " 7 " " candidates of whom 1 was placed in the pass list.

(16) " " 5 " " 2 were placed in the pass list.

(17) " " 9 " " 2 obtained Second Class and 4 were placed in the pass list.

(18) " " 25 " " 5 " " 5 " " 5 " " 5 " "

(19) " " 4 " " 3 were placed in the Pass Course.

(20) " " 5 " " all were unsuccessful.

(21) " " 9 " " 5 were placed in the pass list.

(22) " " 40 " " 2 obtained Second Class and 10 were placed in the Pass Course.

(23) " " 123 " " 1 " " 84 " " " " "

(24) " " 1 was a candidate and was placed in pass list.

(25) " " 24 were placed in the Pass list.

(26) " " 12 " " 5 " " " " "



NAMES OF INSTITUTIONS	PASSED				FAILED IN										Absent	Expelled	Admission cancelled	Percentage of successful candidates*	
	Number of candidates		Honours		English	Vernacular Languages	Second Languages	Linguistics	History	Islamic History	Economics	Philosophy	Mathematics	Science					Aggregate
	1st Class	2nd Class	Distinction	Without Honours															
Nabadwip Vidyasagar College (27) ...	74	...	...	...	19	45	11	4	...	18	15	4	...	...	1	1	...	26.0	
Nalhati Bishi Bankimchandra College (28) ...	80	...	...	1	39	26	4	4	...	10	19	10	...	...	...	8	...	51.9	
Presidency College (29) ...	131	7	91	1	10	3	2	1	...	...	5	1	7	...	2	6	...	87.2	
Raiganj College (30) ...	34	...	...	...	9	28	10	1	...	12	14	1	2	...	...	2	...	28.1	
Seth Anandram Jaipuria College ...	16	...	...	1	10	...	...	1	...	2	2	...	1	...	3	...	...	68.7	
Sanskrit College (31) ...	25	2	14	...	1	6	...	4	1	...	...	...	...	...	2	1	...	70.8	
Scottish Church College (32) ...	295	...	41	1	106	80	46	8	...	47	40	19	4	...	10	8	...	51.6	
Serampore College (33) ...	55	...	1	...	29	16	1	2	...	4	2	...	1	...	...	2	...	56.6	
Sibpur Dinabandhu College ...	13	...	...	1	7	2	1	1	...	1	2	...	...	...	1	1	...	33.5	
South Calcutta Girls' College ...	62	...	...	...	27	32	11	4	...	2	14	5	...	...	1	1	...	44.2	
St. Paul's College (34) ...	69	...	7	...	28	17	10	2	...	8	10	1	1	...	2	2	...	52.2	
St. Xavier's College ...	50	...	25	...	12	4	3	...	...	8	4	...	...	...	3	...	...	74	

	270	...	10	...	86	115	49	6	...	77	...	71	12	11	...	23	3	...	...	39.6
Surendranath College (35)	...	...	10	...	86	115	49	6	...	77	...	71	12	11	...	23	3	...	...	39.6
Suri Vidyasagar College (36)	84	...	10	1	4	20	9	1	...	5	...	14	...	2	...	1	2	...	...	67.0
Syamsundar College	...	...	...	...	4	2	1	...	...	1	...	1	...	1	...	1	...	...	...	50.0
Tamralipta Mahavidyalaya (37)	53	...	...	...	22	24	2	2	...	9	...	...	3	...	...	4	3	...	...	44.0
Uttarpara Raja Pearymohan College	43	...	...	...	15	16	11	3	...	7	...	10	3	...	...	4	...	...	...	41.8
Victoria Institution	143	...	2	4	6	5	29	5	...	21	...	25	13	...	1	8	3	...	...	47.2
Vidyasagar College	426	...	20	3	132	172	105	10	...	98	...	125	5	15	11	15	9	...	...	37.9
Vijaygarh J. R. College (38)	15	...	...	...	6	6	3	...	...	3	...	...	...	...	...	2	...	...	...	40.
Women's Christian College	51	...	9	...	2	10	1	...	...	9	...	...	...	...	...	5	...	...	...	60.7
Non-Collegiate Students (Female)	817	...	16	5	23	333	156	52	...	184	...	207	62	11	...	71	50	...	...	33.3
Non-Collegiate Students (Male)	368	...	4	1	102	125	52	34	...	84	...	51	6	8	2	21	40	2	...	32.6
Non-Collegiate External Students	1416	...	...	3	337	576	317	80	1	376	...	470	30	67	...	84	179	5	...	27.4
GRAND TOTAL	9157	17	520	56	3045	3334	1477	548	3	1874	...	2103	334	208	+	567	450	14	...	41.7

\* Shows the percentage of passes on the actual number of candidates sitting for the examination, excluding those who were absent.

+ 8c. - 35. Ed. - 2.

(27) Of these 20 were female candidates of whom 2 were placed in the Pass list.

(28)	"	84	"	"	"	"	"	"	"
(29)	"	34	"	"	"	"	"	"	"
(30)	"	8	"	"	"	"	"	"	"
(31)	"	7	"	"	"	"	"	"	"
(32)	"	96	"	"	"	"	"	"	"
(33)	"	22	"	"	"	"	"	"	"
(34)	"	9	"	"	"	"	"	"	"
(35)	"	97	"	"	"	"	"	"	"
(36)	"	6	"	"	"	"	"	"	"
(37)	"	9	"	"	"	"	"	"	"

## B.Sc. EXAMINATION, 1957

The number of candidates registered for the B.Sc. Examination held in March, 1957, was 5,559, of whom 2,746 passed, 2,651 failed, 159 were absent and 17 were expelled. Of the successful candidates 1,803 were placed in the Pass list, 346 passed with Honours (87 were placed in the First Class and 259 in the Second Class) and 597 passed with Distinction. Of the total number registered 808 were female candidates, of whom 5 were placed in the First Class, 48 in the Second Class, 38 passed with Distinction and 79 were placed in the Pass list. Of the unsuccessful candidates, 1,681 failed in Mathematics, 1,058 in Physics, 1,801 in Chemistry, 145 in Botany, 9 in Geology, 194 in Zoology, 2 in Geography, 213 in Physiology, 1 in Experimental Psychology, 14 in Anthropology, 11 in Statistics and 3 in the aggregate.

Years	Number of candidates	Number passed	Percentage of passes*
1956	4,720	2,151	46.6
1957	5,559	2,746	50.9

\*Shows the percentage of passes on the actual number of candidates sitting for the Examination excluding those who were absent.

Also 69 candidates appeared in special subjects -

Of whom 27 appeared in Chemistry and 12 passed.

3	Zoology	3 passed
20	Mathematics	6 passed.
15	Physics	5 passed.
3	Physiology	3 failed.
3	Botany	3 passed.

The following Table shows centrewise the number of candidates registered for the B.Sc. Examination, 1957 :—\*

Name of Centres	Number of candidates.	Name of Centres	Number of candidates.
Agartala ...	68	Cooch-Behar ...	44
Bankura ...	84	Darjeeling ...	24
Belhampur ...	208	Gobardanga ...	50
Birbhum ...	76	Howrah ...	187
Burdwan ...	165	Hughli ...	59
Calcutta ...	4,157	Krishnagar ...	78
Chandernagar ...	49	Midnapur ...	155
Contai ...	62	Serampur ...	101

\* Includes the number of candidates appearing in special subjects.

The following is a statement of the number of candidates who failed in one subject only :—

Physiology—69

Physics—135

Chemistry—520

The following Table shows the number of candidates taking up different subjects at the B.Sc. Examination, 1957 (Honours and Pass), the number passed and the percentage of passes :—

Subjects	HONOURS			PASS		
	Number of candidates.	Number passed.	Percentage of passes.*	Number of candidates.	Number passed.	Percentage of passes.*
Mathematics	208	78	37.5	4,394	2,713	61.7
Physics	202	129	63.8	4,360	3,302	75.7
Chemistry	175	48	27.4	4,501	3,200	71
Botany	40	23	70	684	539	78.8
Physiology	39	15	38.5	553	339	61.4
Zoology	25	13	52	709	515	72.6
Geology	32	16	50	75	66	88
Psychology	14	4	28.5	...	...	...
Anthropology	11	4	36.3	85	71	83.5
Geography	6	4	66.6	21	19	90.4
Statistics	16	7	43.7	62	51	82.2

\* Shows the percentage of passes on the actual number of candidates sitting for the Examination excluding those who were absent.

## 280

280

NAMES OF INSTITUTIONS	No. of Candidates	PASSED			FAILED IN											Admission Cancelled	Absent	Expelled	Percentage of successful candidates*		
		Class I	Class II	Distinction	Pass	Mathematics	Physics	Chemistry	Botany	Geology	Zoology	Geography	Physiology	Exp. Psychology	Anthropology					Statistics	Aggregate
Agartala Maharaja B. B. College	64	..	..	4	24	19	18	24	..	..	..	..	..	..	..	..	..	1	..	44½	
Asutosh College (1)	611	2	28	96	203	210	82	139	5	..	..	..	..	..	10	..	12	..	54½		
Bangabasi College (2)	1144	2	33	61	363	407	306	278	23	..	25	2	..	..	..	14	1	50	4	42½	
Bankura Christian College	83	..	2	16	33	16	9	7	..	..	..	..	..	..	..	..	..	1	..	61½	
Berhampur K. N. College (3)	202	..	15	19	93	46	40	28	..	..	..	..	..	..	..	..	..	6	3	65½	
Burdwan Raj College	167	..	1	20	51	60	26	60	..	..	..	..	..	..	..	..	..	3	4	46½	
Chandernagore College (4)	42	..	6	9	17	5	3	7	..	..	..	..	..	..	..	..	..	1	..	74½	
City College (5)	1119	..	31	73	297	330	258	269	98	126	..	166	1	..	..	..	..	26	..	86½	

Cooch-Behar Victoria College	...	42	...	1	9	15	14	6	13	...	...	...	...	...	...	...	...	...	...	59.5
Contai P. K. College	...	61	1	...	11	18	24	9	15	...	...	...	...	...	...	...	...	...	...	50.8
Darjeeling Govt. College (6)	...	20	...	...	5	7	4	1	3	...	...	...	...	...	...	...	...	...	...	60
Darjeeling St. Joseph's College	...	5	...	...	3	1	1	1	...	...	...	...	...	...	...	...	...	...	...	80
Gobardanga Hindu College (7)	...	50	...	...	1	13	26	8	20	...	...	...	...	...	...	...	...	...	...	30.4
Howrah Narasinha Datta College (9)	180	...	1	25	73	40	34	56	...	...	...	...	...	...	...	...	...	...	...	71.9
Hughly Mohsin College (9)	...	35	2	5	7	11	7	3	5	...	...	...	...	...	...	...	...	...	...	73.5
Krishnagar College (10)	...	58	...	4	22	17	8	1	4	...	...	...	...	...	...	...	...	...	...	79.6
Midnapur College (11)	...	142	...	10	44	56	16	13	14	...	...	...	...	...	...	...	...	...	...	78.5
Presidency College (12)	...	174	24	88	4	19	...	1	5	...	...	...	...	...	...	...	...	...	...	77.5
Scottish Church College (13)	...	178	3	17	11	61	43	21	42	...	...	...	...	...	...	...	...	...	...	52.6

(1) Of these 51 were female candidates, of whom 4 passed in II Class, 8 with Distinction and 11 in the Pass course.

(2) Of these 7 were female candidates, of whom 1 passed with Distinction and 3 in Pass Course.

(3) Of these 2 were female candidates of whom 1 passed in Pass Course.

(4) Of these 1 was a female candidate and she passed with Distinction

(5) Of these 11 were female candidates, of whom 16 passed in Class II, 11 with Distinction and 29 in the Pass Course.

(6) Of these 4 were female candidates of whom 1 passed with Distinction and 1 in Pass Course.

(7) Of these 1 was a female candidate and she passed in Pass Course.

(8) Of these 4 were female candidates of whom 2 passed in the Pass Course.

(9) Of these 5 were female candidates of whom 1 passed with Distinction and 1 in the Pass Course.

(10) Of these 1 was a female candidate and she failed.

(11) Of these 4 were female candidates of whom 1 passed with Distinction and 1 in Pass Course.

(12) Of these 41 were female candidates, of whom 6 passed in I, Class 23 in II Class, 1 with Distinction and 3 in Pass Course.

(13) Of these 26 were female candidates, of whom 3 passed in Class II, and 9 in the Pass course.

NAME OF INSTITUTION	No. of Candidates				PASSED												FAILED IN												Percentage of successful candidates*
	With Honours		Without Honours		Class I	Class II	Distinction	Pass	Mathematics	Physics	Chemistry	Botany	Geology	Zoology	Geography	Physiology	Exp. Physiology-	Anthropology	Statistics	Aggregate	Admission Cancelled	Absent	Expelled						
Berampur College (14)	97	...	...	...	11	35	131	77	103	2	...	5	...	...	...	...	...	...	...	...	...	9	1	52.9					
St. Paul's College (15)	80	...	...	...	13	29	24	6	21	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...					
St. Xavier's College	95	1	26	11	11	85	13	8	14	...	...	5	...	...	...	...	...	...	...	1	...	1	...	...					
Surendranath College	254	...	16	29	29	74	91	49	76	3	...	...	...	...	...	...	...	...	...	...	...	7	...	48.1					
Vidyasagar College (Suri Branch)	76	...	...	...	19	22	28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	53.9					
Vidyasagar College (Calcutta) (16)	584	3	23	75	75	237	117	82	97	22	1	27	3	42	...	...	...	...	...	1	...	18	2	59.7					
Non-Collegiate Students (Male) ...	6	...	...	...	...	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	2	...	50					
Non Collegiate External Students (Male)	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
Grand Total	5,359	37	309	597	597	1,853	1,681	1,068	1,301	145	9	194	2	213	1	14	11	3	...	...	...	169	...	17					

(14) Of these 3 were female candidates, of whom 2 passed in the Pass Course.

(15) Of these 1 was a female candidate and she passed in the Pass Course.

(16) Of these 48 were female candidates, of whom 2 passed in Class II, 7 with Distinction and 14 in the Pass Course.

\* Shows the percentage of passes on the actual number of candidates sitting for the examination, excluding those who were absent.

## B Com. EXAMINATION, 1957

The number of candidates registered for the B.Com. Examination held in May, 1957, was 5,021 of whom 2,150 passed, 2,629 failed, 234 were absent and 18 were expelled.

Of the successful candidates 8 were placed in the First Class, 1,578 in the Second Class and 564 in the pass list. Of the total number registered 5 were female candidates of whom none was successful.

Of the unsuccessful candidates, 1,695 failed in English Composition, 583 failed in languages, 542 in Accountancy, 595 in Commercial Law, 1,172 in General Economics and Indian Economics, 514 in Business Organisation and Commercial Geography, 1,029 in Advanced Accountancy and Auditing, 81 in Banking and Currency, 17 in Statistics and Insurance, 14 in Public Administration and Public Finance, 1 in Land System and Agricultural Economics and 77 failed in the Aggregate.

Years		Number of candidates	Number passed	Percentage of passes*
1956	...	4,110	2,000	51.2
1957	...	5,021	2,150	43.6

\* Shows the percentage of passes on the actual number of candidates sitting for the examination excluding those who were absent.



# R.Com. EXAMINATION, 1957

Comparative Table showing the number of candidates sent up from each institution, the number passed, the number failed to obtain the minimum marks allotted to each separate subject or the pass marks in the aggregate and the percentage of successful candidates :—

Name of Institution	PASSED			FAILED IN														No. of candidates	Percentage of successful candidates			
	Class I	Class II	Pass	English Composition	Languages	Accountancy	Commercial Law	General Economics and Indian Economics	Business Organisation and Commercial Geography	Advanced Accountancy and Auditing	Trade, Tariff and Transport	Banking and Currency	Statistics and Insurance	Public Administration and Public Finance	Land Systems and Agricultural Economics	Economic History and Modern Industrial Organisation	Aggregate			Admission cancelled	Absent	Expelled
Agarwala Maharaja Bir Bikram College	...	18	10	26	9	2	...	...	8	7	...	...	...	...	...	...	...	1	...	...	49.1	
Asutosh College	...	104	32	79	32	25	17	31	18	65	...	...	8	...	...	...	...	6	...	...	52.2	
Rangabasi College (1)	...	27	20	45	13	15	12	35	16	26	...	...	4	...	2	...	...	1	...	8	41.2	
Chandernagore College	...	11	6	27	4	4	8	10	...	17	...	...	...	...	...	...	...	...	...	2	26.2	
Charuchandra College (2)	...	15	7	42	19	9	18	25	17	28	...	...	1	...	...	...	...	5	...	9	24.7	

City College	...	5	735	1260	815/246	257	259	553	215	379	...	24	4	6	...	...	16	...	71	5	43.9
Goenka College of Commerce and Business Organisation (3)	34	...	23	...	1	0	3	7	4	6	1	...	...	...	...	...	...	...	...	...	67.6
Kharagpur College	53	...	18	3	28	5	7	14	1	10	...	...	...	...	...	...	...	...	1	...	40.3
Maharaja M. C. College	64	...	27	8	17	6	1	8	5	13	...	...	...	...	...	...	...	...	...	...	54.7
Naihati Rishi Bankimchandra College	134	...	53	16	34	5	6	4	19	6	...	4	...	...	...	...	3	...	2	...	56
Seth Anandram Jaipuria College	95	...	35	7	40	9	9	21	5	14	...	2	...	...	...	...	4	...	7	2	47.7
Sibpur Dinabandhu College	40	...	14	3	9	8	1	3	7	11	...	2	...	...	...	...	...	...	1	...	43.6
St. Xavier's College	223	2	149	6	34	18	5	11	8	21	...	6	...	...	...	...	4	...	5	1	71.5
Surendranath College	517	...	161	53	222	49	64	60	104	71	...	11	8	1	...	...	13	...	14	1	42.5
Vidyasagar College	132	...	36	16	14	13	12	16	26	25	...	3	3	1	...	...	...	...	11	1	41.3
Vidyasagar College, Suri	28	...	6	...	15	4	4	11	8	9	...	...	...	...	...	...	...	...	...	...	21.4
Non-collegiate students	14	...	3	3	3	3	4	2	1	2	...	1	...	...	...	...	...	...	1	...	46.2
Non-collegiate External student.	829	...	142	114	244	135	114	129	110	156	...	15	2	4	1	...	24	...	98	...	36.4
GRAND TOTAL	5,021	8	1,578	564	583	542	595	1,172	514	1,081	1	81	17	14	1	...	77	...	351	12	43.6

(1) Of these 1 was a female candidate and she was unsuccessful.

(2) Of these 2 were female candidates and non of them came out successful.

(3) Of these 2 were female candidate of whom one was successful.

The following table shows the names of the Colleges from which the number of candidates appeared and the number passed according to the different sex at the First M.B.B.S. Examination, held in December, 1956.

Institutions	PART I				PART II				PARTS I AND II			
	No. of candidates appeared	Number successful	Number Absent		Number of candidates appeared	Number successful	Number Absent		No. of candidates appeared	Number successful	Number Absent	
N. R. Sircar Medical College	M. 59 F. 6	M. 47 F. 3	M. 4 F. ...	M. 101 F. 17	M. 71 F. 11	M. 1 F. ...	M. 10 F. 1	M. 2 F. ...	M. 9 F. ...	M. 8 F. ...	M. 1 F. ...	M. ... F. ...
Calcutta Medical College ...	M. 94 F. 2	M. 24 F. 2	M. 2 F. ...	M. 91 F. 2	M. 25 F. 1	M. ... F. ...	M. 22 F. ...	M. 1 F. ...	M. 9 F. 1	M. 1 F. ...	M. 2 F. ...	M. ... F. ...
R. G. Kar Medical College ...	M. 38 F. ...	M. 20 F. ...	M. 3 F. ...	M. 55 F. ...	M. 31 F. ...	M. ... F. ...	M. 9 F. ...	M. 1 F. ...	M. 22 F. ...	M. 1 F. ...	M. 2 F. ...	M. ... F. ...
National Medical College ...	M. 25 F. ...	M. 11 F. ...	M. 2 F. ...	M. 83 F. 6	M. 51 F. 5	M. 2 F. 2	M. 9 F. 1	M. 1 F. ...	M. 9 F. 1	M. 1 F. ...	M. 2 F. ...	M. ... F. ...
Total	166	102	11	270	178	3	50	7	50	7	4	...

Statement showing the number of candidates who appeared and were successful at the different parts of the Final M.B.B.S Examination held in December, 1956, according to different sex :—

Institutions	Part I (b)			Part I (b) & Pathology			Pathology only			PART I			PART II			PARTS I AND II		
	No. appeared	No. Passed	No. absent	No. appeared	No. passed	No. absent	No. appeared	No. passed	No. absent	No. appeared	No. passed	No. absent	No. appeared	No. Passed	No. absent			
N R Sircar Medical College	69	19	1	67	4	35	11	2	8	1	1	6	17	317	2	65	10	3
(Calcutta Medical College	68	4	16	31	8	17	11	1	10	1	1	20	48	183	1	155	17	47
Do. '1951' Regulations	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
R. G Kar Medical College	69	18	41	57	27	...	11	...	8	2	28	25	44	291	1	22	15	47
Calcutta National Medical College	4	2	3	49	6	26	32	3	23	2	10	16	10	8	...	68	4	25
Total	150	25	99	204	18	105	65	6	55	4	2	61	1	58	1	511	46	156

## LL.B. EXAMINATION, JUNE, 1956

COLLEGES	Preliminary					Intermediate					Final								
	Number of candidates	Number Passed				Number of candidates	Number Passed				Number of candidates	Number Passed							
		First Division	Second Division	Total	Expelled		Absent	First Division	Second Division	Total		Expelled	Absent	First Division	Second Division	Total	Expelled	Absent	
University Law College.	460	415	154	158	...	101	243	112	126	127	...	34	306	312	125	...	35		
Surendranath Law College.	169	1	59	60	...	89	123	...	72	72	...	11	72	1	54	55	...	7	
GRAND TOTAL ...	(a) 629	5	213	218	...	140	366	(b)	1193	199	...	45	278	(c)	4	176	180	...	42

(a) Of these, 6 were female candidates of whom 2 passed in Class II.

(b) " 4 " " " " 2 passed in " "

(c) " 5 " " " " 3 " " "

## LAW EXAMINATION, FEBRUARY, 1957

COLLEGES	Preliminary					Inter- mediate					Final							
	Number of candidates	Number Passed				Number of candidates	Number Passed				Number of candidates	Number Passed						
		First Division	Second Division	Total	Expelled Absent		First Division	Second Division	Total	Expelled Absent		First Division	Second Division	Total	Expelled Absent			
University Law College.	408	418	189	...	103	230	...	130	130	...	16	177	310	105	...	37		
Surendranath Law College	228	...	75	75	...	28	105	...	66	66	...	14	93	5	47	52	...	7
Non-Collegiate Student, female.	1	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
GRAND TOTAL ...	637 (a)	4	261	265	...	140	335 (b)	...	196	196	...	60	270 (c)	8	149	157	...	44

(b) One was a Female candidate and she failed.

(c) There were 4 Female candidates, of whom 2 passed in Class II.

## M.A. EXAMINATION, 1956

TABLE OF RESULTS

Subjects	Number of candidates registered	Passed in			Absent	Examination cancelled	Expelled	
		Class I	Class II	Class III				
English	149	...	31	30	29	9	...	...
Sanskrit	37	6	10	7	7	3	...	...
Pali	2	1	...	...	1	...	...	...
Arabic	1	...	1	...	...	...	...	...
Persian	3	2	1	...	...	...	...	...
French	2	1	...	...	...	...	...	...
Modern Indian Language (Bengali)	205	...	84	120	44	10	...	...
Do. (Hindi)	27	...	14	6	4	...	...	...
Do. (Urdu)	3	...	...	1	1	...	...	...
Comparative Philology	5	...	3	...	2	...	...	...
History	212	3	57	72	19	6	...	...
Ancient Indian History and Culture.	82	...	16	20	11	2	...	...
Islamic History and Culture	88	...	31	24	15	6	...	...
Economics	159	1	65	34	31	6	...	...
Political Science	166	...	36	44	23	14	...	...
Pure Mathematics	11	2	3	...	2	1	...	...
Applied "	1	...	...	...	...	...	...	...
Botany	2	...	2	...	...	...	...	...
Psychology	10	...	7	2	...	...	...	...
Statistics	4	...	1	2	...	...	...	...
Geography	12	2	7	2	...	...	...	...
Education	11	...	6	2	2	...	...	...
Commerce	416	2	84	135	75	6	...	...
Grand Total	1,608*	20	459	501	266	63	...	...

\* There were 404 female candidates, of whom 267 passed (Class I—5, Class II—127, and in Class III—135).

## M.Sc. EXAMINATION 1956

## Table of Results

Subjects	No. of Candidates registered.	PASSED IN CLASS			Absent.	Examination cancelled	Expelled.
		I	II	III			
Pure Mathematics ...	160	6	22	9	...	...	
Anthropology ...	10	...	6	3	1	...	
Applied Mathematics ...	44	11	7	5	4	...	
Chemistry ...	34	15	12	...	1	...	
Education ...	8	...	7	1	...	...	
Physics ...	67	8	42	5	3	...	
Botany ...	52	6	22	1	1	...	
Physiology ...	37	5	25	1	1	...	
Zoology ...	13	4	9	...	...	...	
Geology ...	19	13	5	...	1	...	
Psychology ...	19	1	13	2	1	...	
Statistics ...	20	5	6	3	...	...	
Geography ...	7	4	3	...	...	...	
...	...	...	...	...	...	...	
...	...	...	...	...	...	...	
Grand TOTAL ...	470*	78	179	30	13	...	

\* Of these 56 were female candidates of whom 43 passed (Class I—8, Class II—28 and Class III—4).





The following table shows the number of candidates registered, the number passed and the number absent or expelled and the percentage of passes at the various Examinations held during June, 1956—December, 1956 :—

Names of Examinations	Number of candidates registered	NUMBER PASSED						Absent	Expelled	Percentage of passes
		First Class or Division	Second Class or Division	Third Class or Division	Distinction	Pass	Total	Admission Cancelled		
B. D. S. Final (June) '56	3	..	..	..	..	3	3	..	..	100
D. T. R. P. (June) '56	4	..	..	..	..	4	4	..	..	100
Diploma in Li rarianship (June '56 (1	54	5	23	17	..	..	45	6	..	93.7
Certificate in Tanning	8	1	6	..	..	..	7	..	..	87.5
T. D. D. (July) '56	13	..	7	..	..	6	6	..	..	46.1
Cert in Applied Psychology (July) '56 (2)	9	1	..	..	..	..	8	..	..	88.9
M.Sc. (Agri.) Part II	1	1	..	..	..	..	1	..	..	100
T. T. Art's Appreciation (3)	3	..	..	..	5	8	8	..	..	100
D. T. M. & H. August	53	..	..	..	..	42	42	..	..	77.8
I Sc. Comp (August) '56 (4)	344	..	..	..	..	711	711	..	..	84.7
D G.O September '56 (5)	36	..	..	..	..	19	19	..	..	52.7
I.A. (Comp.), (August) '56 (6)	637	..	..	..	..	439	439	..	..	73.4
D O.M.S., Part II, (Sept.) '56	4	..	..	..	..	1	1	..	..	25
B.A. (Comp.) (Sept.) '56 (7)	241	..	..	..	..	142	142	..	..	55.7
B.Sc. (Comp.) (Sept.) '56 (8)	348	..	..	..	..	261	261	..	..	77.4
M.E. (November) '56	4	..	..	..	..	2	2	..	..	50
B.Com (Comp.) (Nov.) '56	149	..	..	..	..	351	351	..	..	79.4
B Arch. Part III (Nov.) '56	5	1	2	..	..	..	3	..	..	60
B.Sc (Agri.) (Comp.) November, '53...	3	..	..	..	..	3	3	..	..	100
Dip. in Diet. Sept '56 (9)	3	..	..	..	..	3	3	..	..	100
D P. H. Pt. II Nov. '56	7	..	..	..	..	6	6	..	..	85.7
B.D.S. Final (Nov.) '56	3	..	..	..	..	3	3	..	..	100



The following table shows the number of candidates registered, the number passed and the number absent or expelled and the percentage of passes at the various Examinations held during June, 1956—December, 1956 :—

Names of Examinations	Number of candidates registered	NUMBER SUCCESSFUL					Absent	Expelled	Percentage of Passes
		I	II	III	Distinction	Pass			
Certificate in Language (1) Hindi, September, 1956	2	...	1	1	...	...	2	...	100
" " (2) Tibetan " " "	4	1	2	...	...	...	3	...	75
" " (3) French " " "	9	...	...	3	...	...	3	1	37.5
" " (4) German " " "	20	1	14	4	...	...	19	...	95
" " (5) Russian " " "	12	2	7	1	...	...	10	...	83.3
" " (6) Chinese " " "	7	1	2	3	...	...	6	1	100
D.P.H., Part I, September, 1956	60	...	...	...	...	48	48	1	81.4
D.I.H., Part I, October, 1956	9	...	...	...	...	6	6	...	66.6
Diploma in Nutrition, Part I, October, 1956	4	...	...	...	...	4	4	...	100
B.D.S., 1st Prof. November, 1956	12	...	...	...	...	5	5	...	41.7
" 2nd Prof. " " "	16	...	...	...	...	11	11	...	68.7

" 3rd Prof. " "	...	16	...	...	...	...	...	14	14	...	...	87.5
B.Arch., Part I, (Comp.), November, 1956	...	6	...	...	...	...	...	6	6	...	...	83.3
" Part II, " "	...	3	...	...	...	...	...	1	1	...	...	33.3
Diploma in Librarianship, December, 1956	...	5	1	...	...	3	...	...	4	1	...	100

The following table shows the number of candidates registered, the number absent or expelled and the percentage of passes at the various Examinations held during January—May, 1957 :—

Names of Examinations	Number of candidates registered	NUMBER SUCCESSFUL					Absent	Expelled	Percentage of Passes
		I	II	III	Distinction	Pass			
Diploma in Languages (1) Chinese, January 1957 ...	2	1	...	...	...	...	1	...	100
" " (2) French, " " (1) ...	2	...	...	...	...	...	1	...	Nil
" " (3) Russian, " " ...	4	...	2	...	...	...	4	...	100
" " (4) Tibetan, " " ...	1	...	1	...	...	...	1	...	100
" " (5) German, " " ...	1	...	1	...	...	...	1	...	100
First B.V. Sc., Part I, January, 1957	10	...	...	...	...	6	6	...	60
" " " II, " " ...	19	...	...	...	...	15	15	...	79
" " " I & II, " " ...	1	...	...	...	...	...	...	...	Nil
Second " " January, 1957 (2)	18	...	...	...	...	10	...	...	55.6
T.D.D., January, 1957	6	...	...	...	...	2	2	...	33.3
Diploma in Nutrition, Part II, March	4	...	...	...	...	4	4	...	100
D.P.H., Part I, January, 1957	13	...	...	...	...	13	13	...	100
D.I.H., Part I, January, 1957	3	...	...	...	...	3	3	...	100
Diploma in Anaesthesia, Part I, January, 1957 (3)	7	...	...	...	...	3	3	...	42.9
D.O.M.S., Part I, February, 1957 (4)	14	...	...	...	...	9	9	...	64.3
" " Part II, " " ...	10	...	...	...	...	4	4	...	40
Diploma in Anaesthesia, Part II, February, 1957	5	...	...	...	...	2	2	...	40
D.T.M. & H., February, 1957 (5)	11	...	...	...	...	8	8	...	72.7
Sp. Test for admission to B.Mus. Test, February, 1957 (6)	7	3	...	4	...	...	7	...	100
I.Sc. Agriculture, March, 1957	16	10	5	...	...	...	15	...	93.7
Diploma in Dietetics. March, 1957 (7)	9	...	...	...	...	9	9	...	100
D.I.H., Part II, March, 1957	11	...	...	...	...	11	11	...	100



## APPENDIX J

List of Professors, Lecturers, Teachers, Officers, and other employees of the different Departments showing their grade, date of appointment and salary as on 31st May, 1957.

Vice-Chancellor		Rs.
Prof. Nirmalkumar Sidhanta, M.A. (Cantab.)	1955	2,500
Treasurer		
Sri Satischandra Ghosh, M.A.	1954	1,200+C.A. 125

## I

## University Colleges of Arts and Commerce Departments

## (1) ANCIENT INDIAN HISTORY AND CULTURE

Name	Grade Rs.	Date of first Appointment.	Present salary. Rs.
Prof. Jitendranath Banerjee, M.A. Ph.D. (Carmichael Professor).	800-40-1,000-E.B. -50-1,250	1918	950
Prof Niharranjan Ray, M.A., D.Lett. & Phil. (Leyden), Dip.Lib. (Lond.), F.L.A. (Bagiswari Professor of Fine Arts).	Do.	1933	1,000
Dr. Benoychandra Sen, M.A., Ph.D	500-25-600	1926	600
Sri Sarasikumar Saraswaty, M.A.	Do.	1954	550
Sri Durgadas Mookerjee, M.A.	250-25-500-E.B. -25-600	1945	380
Dr. Kalyankumar Ganguli, M.A., D Phil.	Do.	1954	450
Dr. Sudhirranjan Das, M.A., D.Phil.	Do.	1955	450
Sri Nalininath Dasgupta, M.A.	Do.	1943	325
Sri Taponath Chakravarty, M.A. (Tutor)...		1954	200
Sri D. P. Ghosh, M.A. ...	...	1935	Honorary

## (2) ARABIC AND PERSIAN

Prof. Muhammad Zubair Siddiqi, M.A., LL.B., Ph.D. (Cantab.) (Sir Asutosh Pro- fessor).	800-40-1000-E.B. -50-1,250	1929	1,000+300 P.A.
Dr. Md. Ishaque, M.A., B.Sc., Ph.D. (Lond.).	500-25-600	1927	600
Janab Aga Meerza Mohsin Namazie.	250-25-500-E.B. -25-600.	1937	600
Janab Fazlur Rahman Baqui ...	Do.	1932	480
Janab Md. Akbar, M.A (Double)	Do.	1940	380
Janab Attakarim Burke, M.A., M.Litt. (Tehran), (temp.).	Do.	1954	275

Name	Grade Rs.	Date of first Appointment.	Present salary, Rs.
(3) COMMERCE			
Sri Kalipada Roy, M.A.	250-25-500-E.B. -25-600	1955	425
Sri Byomkes Basu, M.A., LL.B.	...	1955	100
Sri Susrut Mukherjee, M.A., A.C.A.	...	1955	100
Sri Hirendramohan Majumdar, M.Sc., LL.B., R.A., A.S.A.A., F.C.A.	...	1940	150
Sri J. M. Majumdar, M.A.	...	1954	100
Sri Radhabhusan Bose, M.A., B.Sc., B.Com., R.A. A.S.A.A., Cert. A.I.I.B.	...	1944	100
Sri Sital Ch. Sengupta, M.A., G.D.A., R.A.	...	1943	100
Sri R. N. Sengupta, M.A., B.Com.	...	1954	100
Sri D. K. Sanyal, M.A., B.Com., O.B.E.	...	1933	Honorary
Sri Narendranath Sarkar, M.A., R.A., F.S.A.A., A.C.W.P., A.C.I.S., A.C.I.L., A.I.S.A.	...	1927	Do.

## (4) COMMERCE (EVENING)

Sri Motilal Dam, M.A. (Lecturer- in-Charge).	250-25-500-E.B.- 25-600.	1950	600+100
Sri Ajitkumar Nandy	Do.	1956	400
Sri Manibhusan Sanyal, M.A.	Do.	1956	425
Sri B. B. Ghosh, M.A., Ph.D. ...	Fixed	1949	100
Sri Binayaknath Banerjee, M.A., LL.B.	„	1949	100
Sri D. P. Chatterjee, B.A., B.Com., A.C.A., F.S.A.A.	„	1949	100
Sri B. K. Sengupta, M.A.	...	1949	100
Sri D. P. Paul, M.A.	...	1954	100
Dr. Bimalendu Dhar, M.A., D Phil.	„	1953	100
Sri Anil K. Mukherjee, M.A. ...	„	1950	100
Sri S. C. Chatterji, M.A., LL.B., F.C.I.I.	„	1950	100
Sri G. Saha, B.Com., R.A., A.C.A., F.S.A. (Lond.).	„	1950	100
Sri N. M. Ghosh, M.A., LL.B.	„	1955	100
Sri Arunkumar Dattagupta, M.A., D.Phil.	„	1955	100
Dr. N. Sanyal, M.A., Ph.D. ...	„	1950	100
Sri Bimalcoomar Ghosh, B.Sc., Econ. (Lond.), B.Ccm. (Lond.)	„	1950	100
Sri S. N. Banerjee, M.A., G.D.A., A.I. C.W.A.	„	1954	100
Sri Satyasaran Chatterjee, M.A.	„	1956	100



Name	Grade	Date of first Appointment.	Present salary.
	Rs.		Rs.
<b>Commerce (Evening)—Office</b>			
Chatterji, Sri Jyotirmay	70-4-110-E.B.-5-180	1945	102+16 (Evening Union)
Guha, Sri Sankarprasad	Do.	1956	70

## (5) COMPARATIVE PHILOLOGY

Dr. Sukumar Sen, M.A., Ph.D., (Kumar Guruprasad Singh Professor).	800-40-1,000-E.B. -50-1,250	1980	800
Sri Dwijendranath Basu, M.A.	250-25-500-E.B.- 25-600.	1954	325
Dr. Chinmay Datta, M.A., D.Phil.	Do.	1956	260

## (6) ECONOMICS

Prof J. P. Niyogi, M.A., Ph.D. (University Professor).	800-40-1,000-E.B. -50-1,250	1917	1000+300 P.A.
Prof Sarojkumar Bose, M.A., Ph.D., (Professor of Industrial Finance).	800-40-1,000-50-1,250.	1937	1,000
Dr. Satyendranath Sen, M.A. Ph.D. (Lond.). (On deputa- tion to Socio-Economic Survey.)	500-50-700	1947	700
Sri Panchanan Chakrabarty, M.A.	250-25-500-E.B.- 25-600.	1933	600
Sri J. K. Mitra, M.A.	Do.	1954	450
Sri Amlankusum Dutta, M.A.	Do.	1948	450
Sri Alok Ghosh, M.A.	Do.	1954	425
Sri Santoshkumar Bhatta- charyya, M.A.	Do.	1952	425
Sri Rakhal Ch Datta (Temp.)	Do.	1957	250
Sri Prabodh Ch. Ghosh, M.A.	...	1951	100
Sri Praesantakumar Ray	...	1957	100
Sri Tapas Majumdar, M.A.	...	1954	Honorary

## (7) EDUCATION AND TEACHERS' TRAINING DEPARTMENT

Sri Kamalakanta Mookerji, M.A., B.T., Diploma in Sp. Eng. (Offg. Head of the Dept.).	500-25-600	1935	525+100
--	------------	------	---------

Name	Grade	Date of first Appointment.	Present salary.
	Rs.		Rs.
Sri Jogeschandra Chakrabarty, M.A., B.T.	250-25-500-E.B.-25-600.	1950	300
Sri Kalisankar Gupta, M.Sc., B.T.	Do.	1942	420
Sri Gourbaran Kapat, M.Sc. ...	Do.	1945	360
Sri Munindrachandra Ghosh, M.Sc.	Do.	1939	340
Sri Subodh Ch. Dutta, M.A.	...	1950	260
Sri Jyotirmay Ganguli, M.A., B.T.	...	1954	250
Sri Bhujangabhasan Bhattacharyya, M.Sc., B.T.	...	1954	250
Sri Semendramohan Banerjee	Do.	1957	250
Sri Birendramohan Acharya, M.A.	Fixed	1957	155
Sri Tarapada Biswas	Part-time		100
Sri Nirmal Ch. Sinha, M.A. ...	...	1949	50
Sri J. N. Dey, M.A.	...	1941	50
Sri Bisnubrata Bhattacharyya	...	1955	50
Sri K. P. Chowdhury, M.A.	...	1954	Honorary
Sri Dibakar Das Muhanto, M.A., B.T. ( <i>on leave</i> )		1958	Do.
Dr. Mrs. Suhasi Ghosh, M.A., B.T. ...		1953	Do.
	Ph.D. (Lond.). ( <i>on leave</i> ).		
Sri Santi Chatterjee, M.A.		1957	Do.
Sri D. N. Ray, M.Sc., B.T., M.Ed.	...	1952	Do.

## Office

Mitra, Sri Prafullakumar, B.Com.	100-10-210-E.B.-10 300- Sp.E.B.-15-330.	1951	110
Mookerjee, Sri Debadideb, B.Sc., LL.B.	Do.	1936	190
Chatterjee, Sri Manoharchandra	70-4-110-E.B.-5-180	1935	98

## (8) ENGLISH

Prof. Miss Amy Geraldine Stock, B.A. (Oxon) (Sir Gooroodass Banerjee Professor).	800-40-1,000-E.B.-50-1,250.	1956	920
Dr. Srichandra Sen, M.A., Ph.D., M.Litt. (Cantab.).	500-25-600	1938	600
Sri Jyotibhasan Bhattacharya, M.A.	250-25-500-E.B.-25-600.	1956	400
Sri K. C. Lahiri, M.A.	Do.	1944	425
Sri P. C. Ghosh, M.A.	Do.	1945	400
Sri Debadas Sen, M.A.	Do.	1948	400
Dr. Satyendrakumar Das, M.A., Ph.D.	Fixed	1955	100
Sri Amritlal Ganguli	...	1955	100
Sri Amulyadban Mukherjee	...	1955	100

Name	Grade	Date of first Appointment.	Present salary.
	Rs.		Rs.
Dr. Subodhchandra Sengupta, M.A., Ph.D. (Presidency College).	...	1950	Honorary
Sri Taraknath Sen, M.A. (Presi- dency College).	...	1938	Do.
Mrs. Nirmala Sinha, M.A.	...	1952	Do.

## (9) FRENCH

Sri Nagendranath Chandra, M.A. (Language Instructor).	Fixed	1949	150
Mrs. Martha Malica Guha	Fixed	1956	100

## (10) HINDI

Sri Lalitaprasad Sukul, M.A.	600-25-800	1933	600
Sri Kulyan Mal Lodha, M.A.	250-25-500-E.B.- 25-600	1948	400
Sri Bisnukant Sastri, M.A.	Do.	1953	325

## (11) HISTORY

Prof. Narendrakrishna Sinha, M.A., Ph.D. (Sir Asutosh Professor).	800-40-1,000-E.B. -50-1,250.	1932	960
Sri Tripurari Chakrabarti, M.A.	250-25-500-E.B. -25-800	1920	600
Dr. Sivapada Sen, B.A., Hons., D.Litt. (Lond.).	Do.	1944	425
Sri Ramaprasad Dasgupta, M.A.	Do.	1935	600
Dr. Atindranath Basu, M.A., Ph.D.	Do.	1946	420
Dr. Pratulchandra Gupta, M.A. Ph.D.	Do.	1939	525
Dr. Anilchandra Banerjee, M.A., Ph.D. (Manindra Ch. College).		1943	100
Miss Sipra Sarkar, M.A.		1957	100
Sri Nisitchandra Roy		1955	100
Dr. R. C. Mitra, M.A. (Charu- chandra College).		1951	100
Sri Taritkumar Mukherjee, M.A. (Central College).		1953	100
Sri Sushovanchandra Sarkar, M.A. (Presidency College).		1926	Honorary
Sri Amalesh Tripathi, M.A., D.Phil.		1955	Do.

Name	Grade	Date of first Appointment.	Present salary.
	Rs.		Rs.
(12) ISLAMIC HISTORY AND CULTURE			
Prof. Makhanlal Raychaudhuri, M.A., LL.B., D.Litt., Sastri, (Professor and Head of the Dept.).	800-40-1,000-E.B. -50-1,250	1942	920
Dr. Sukumar Ray, M.A., D.Phil.	500-25-600	1944	525
Janab Mohibul Hasan Khan, B.A. (Lond.) (on leave).	250-25-500-E.B.- 25-600	1942	480
SM. Quamiruddin	Do.	1957	250
Dr. Mahdi Hussain, M.A., Ph.D., D.Litt. (Paris)	Do.	1944	600
Janab Niyaz Ahmed, M.A.	...	1949	100
Dr. Atul Ch. Ray, M.A., D.Phil.	...	1954	100
Sri Hiralal Chopra, M.A.	...	1955	100

## (13) LANGUAGES (INSTRUCTORS)

Sri Amitabha Mitra, M.A. (Supervisor and Instructor-in-Charge, Modern Language Dept.).	250-15-400	1949	325
Sri Amalendu Sircar, M.A. (Hindi.).	Fixed	1952	100
Jho Lama (Tibetan)	...	1952	125
Mr. Lee Ko Nong, B.A. (Chinese)	..	1955	100
Sri Nagendranath Chandra, M.A. (French)	..	1926	100
Dr. H. G. Biswas, M.Sc., Ph.D. (German).	..	1950	100
W H. Ping	...	1956	100
Sri R. M. Bose	...	1956	100
Mr. G. Fischer	..	1957	250
T. Tomdook Lama	..	1956	150
Mrs. O. N. Gouseva (Russian)	..	1952	150
Mrs. Martha Malicka Guha	Dc.	1954	150
Sri Asitbaran Banerjee	70-4-110-E.B.- -5-180	1958	70

## (14) MODERN INDIAN LANGUAGES

Prof. Sashibhushan Dasgupta, M.A., Ph.D., (Ramtanu Lahiri Professor.)	800-40-1,000-E.B. -50-1,250	1939	840
Sri Pramathanath Bisi, M.A.	500-25-600	1950	550
Sri Maheswar Das, M.A. (Double)	250-25-500-E.B. -25-600	1932	400+50 (mess)
Sri Taraknath Ganguli, M.A.	Do.	1956	375
Dr. Bijanbehari Bhattacharyya, M.A., D.Phil.	Do.	1955	425
Sri Asitkrishna Banerjee, M.A.	Do.	1956	300
Sri Asutosh Bhattacharyya, M.A.	Do.	1955	475
Dr. Tarasankar Bhattacharyya, M.A., D.Phil.	...	...	Honorary
Sri Janardan Chakrabarti, M.A. (Presidency College).	..	1945	..
Sri Haraprasad Mitra, M.A., D.Phil.		1956	..

Name	Grade Rs.	Date of first Appointment.	Present salary- Rs.
(15) PALI			
Prof. Nalinaksha Datta, M.A., LL.B., Ph.D., D.Lit. (Uni- versity Professor).	800-40-1,000-E.B. -50-1,250	1918	1,000
Dr. Anukulchandra Banerjee, M.A., Ph.D. (on study leave).	500-25-600	1948	525+25 (I.V.)
Sri Dwijendralal Barua, M.A. ...	250-25-500-E.B. -25-600	1937	460
Sri Prabhaschandra Majumdar	Do.	1956	300
Sri Dineschandra Bhattacharyya		1950	Honorary
Sri Syamsundar Banerjee (Sanskrit College) (on leave)		1946	Do.
Sri Sukumar Sengupta, M.A.		1955	Do.
Sri Heramba Ch. Chatterjee M.A.		1956	Do.

## (16) PHILOSOPHY

Dr. Satischandra Chatterjee, M.A., Ph.D. (Offg. Hd.)	250-25-500-E.B. -25-600	1917	600+100
Dr. Rasbihari Das, M.A., Ph.D.	Do.	1946	600
Dr. Adharchandra Das, M.A., Ph.D.	Do.	1930	600
Sri Kalyanchandra Gupta, M.A.	Do.	1949	475
Dr. Jitendranath Mahanti, M.A., Ph.D.	Do.	1955	325
Sri Kalikrishna Banerjee, M.A. (Bangabasi College).	...	1952	100
Capt Jyotishchandra Banerjee, M.A. (Asutosh College), from December, 1954	...	1954	100
Sri Anilkumar Raichaudhuri, M.A., D.Litt.	...	1955	100
Sri Renadaranjan Chakravarty, M.A. (Narasinha Datta College).	...	1952	100
Sri Subodhkumar De	...	1957	100
Sri Provasjiban Chaudhuri, M.A.		1955	Honorary
Dr. Pritibhushan Chatterjee, M.A., D.Phil.		1956	Do.
Sri Tarasankar Bhattacharyya M.A., D.Phil.		1955	Do.

## (17) POLITICAL SCIENCE

Prof. Debendranath Banerjee, M.A. (S. N. Banerjee Prof. of Political Science.)	800-40-1,000-E.B. -50-1,250	1948	1,000
Dr. J. K. Banerjee, D.Litt. (Paris) (on study leave)	500-25-600	1949	500
Sri Santoshkumar Chatterjee, M.A.	250-25-500-E.B.- 25-600	1951	450

Name	Grade Rs.	Date of first Appointment.	Present Salary. Rs.
Sai Subimalkumar Mukherjee, M.A.	250-25-500-E.B. -25-600.	1948	400
Dr. Dhirendranath Sen, M.A., Ph.D.	Do.	1930	400
Sri Khagendranath Sen, M.A. (Aantosh College.)	...	1929	100
Sri Sunilkumar Maitra, M.A.	...	1955	100
Sri Sisirkumar Das, M.A., LL.B., Barrister-at-Law.	...	1940	100
Sri Nirmal Ch. Bhattacharyya, M.A., LL.B. (Scottish Church College.)	...	1926	100
Sri Sunilkumar Raichaudhury, M.A.	...	1955	100
Sri Sovarhoy Ghosh, M.A. (Vidyasagar College.)	...	1949	100
Sri Parimal Ch. Ghosh, M.A.	...	1955	100
Sri Ramesh Ch. Ghosh, M.A. (Presidency College.)	...	1948	Honorary
Sri Nirmal K. Bose, M.Sc.	...	1938	Do.
Sri Upendranath Ghoshal, B.Sc. Econ. (Lond.).	...	1923	Do.
Sri Ramaprasad Dasgupta, M.A.	...	1949	Do.
Dr. Bency Ch. Sen, M.A., Ph.D.	...	1949	Do.

## (18) SANSKRIT

Dr. Asutosh Sastri, M.A., Ph D. (Sir Asutosh Professor).	500-40-1,000-E.B. -50-1,250	1935	960
Sri Kunjagobinda Goswami, M.A.	500-25-600	1939	525
Pt. Krishnagopal Goswami Sastri, M.A., Smriti-Mimansa-tirtha.	Do.	1937	525+60 (Mess)
Dr. Janakiballav Bhattacharyya, M.A., Ph D.	Do.	1946	525
Pt. Pattabhirama Sastri	250-25-500-E.B. -25-600	1952	600
Pt. Srijob Nyayatirtha, M.A.	Do.	1937	380
Pt. Bhutnath Chatterjee, Saptatirtha.	Do.	1951	300
Dr. Ajitranjan Bhattacharyya, M.A., D.Phil.	Do.	1956	250
Pt. Teranath Tarkatirtha, M.A.	...	1953	100
Dr. Sibendranath Ghoshal, M.A., D.Phil.	...	1955	100
Pt. Ayodhyanath Sanyal Sastri	...	1952	150
Dr. Gaurinath Bhattacharyya, M.A., D.Litt. (Sanskrit College).	...	1944	100
Dr. Pulitbehari Chakraborty, M.A., D.Litt.	...	1955	100
Pt. Narendra Ch. Bhattacharyya, M.A., Vedanta-tirtha (Secy., Sans. Publn.).	...	1941	100

Name	Grade	Date of first Appointment.	Present Salary.
	Rs.		Rs.
Dr. P. C. Lahiri, M.A., Ph.D.	...	1951	Honorary
Sri Nibaranachandra Chatterjee (Surenranath College)	..	1956	Do.
Sri Amiyakumar Chakravarty, M.A. (St. Paul's College)	...	1952	Do.
Sri Bhupendrachandra Smriti- tirtha (Sanskrit College)	...	1955	Do.
Sri Sudhirkumar Sengupta, M.A. (Double) (City College) Kavya-Sankhya- Vedantatirtha.	...	1955	Do.
Pandit Ramchabila Sastri		1956	Do.

## (19) BENGALI MSS. DEPARTMENT

Sri Prafullachandra Pal, M.A.	100-10-250	1950	170
-------------------------------	------------	------	-----

## (20) SANSKRIT MSS. DEPARTMENT

Pt. Narendrachandra Bhatta- charyya, M.A., Sankhya- Vedantatirtha (Secretary, Sanskrit Publication).	Fixed	1941	150
---	-------	------	-----

## (21) University Colleges of (Arts) Office

## SECRETARY

Dr. Golapchandra Raychandburi, M.A., Ph.D.	500-50/2-800	1948	750
---	--------------	------	-----

## ASSISTANTS

Chatterji, Sri Manindrakumar, M.A., I.L.B. (Superintendent)	250-15-400	1932	325+40 (Mess).
Banerjee, Sri Homeshchandra, B.A.	100-10-210-E.B.- 10-300-Sp. E.B.- 15-330.	1955	210
Banerjee, Sri Byomkes	...	Do.	1926 260+50 (Union) +35 (Ath.) 110
Banerjee, Sri Prithwischandra, M.A., Dip. (Chinese).	Do.	1948	
Das, Sri Anilranjan, B.A.	Do.	1951	180
Majumdar, Sri Jalindranath	...	Do.	1919 260+20 (I.V.)
Mitra, Sri Rabindranath, B.A.	Do.	1937	120+25 (I.V.)
Mookerjee, Sri Jajnakisor, B.Sc.	Do.	1935	230
Mookerjee, Sri Baridbaran, B.A.	Do.	1938	170+25+35 (Steno. all.) & (I.A.S.).
Mookerjee, Sri Debkumar	...	Do.	1941 150+80 (Socio. E.Com.)
Pal, Sri Provaschandra	...	Do.	1919 260+80 (Cal. Review)
Purkayast, Sri Pulinkrishna, B.A.	Do.	1946	180

Name	Grade	Year of first appointment.	Present salary.
	Rs.		Rs.
Bhattacharyya, Sri Gourgobinda, B.A.	70-4-110-E.B.-5-180	1941	110
Dutt, Sri Upendranath ...	Do.	1928	125
Ghosh, Sri Bamandas ...	Do.	1944	110+80+60 (Ath.) (Union)
Majumdar, Sri Nityaranjan	Do.	1958	82
Mtra, Sri Sukumar ...	Do.	1945	78+25 (I.V.)
Rioy, Sri Dilipkumar ...	Do.	1944	86
Roy, Sri Pranesh Ch. ...	Do.	1957	70

## II University College of Science Department

### (1) AGRICULTURE

Prof. P. K. Sen, M.Sc., Ph.D. (Lond.), D.I.C., F.B.S. (Kumar Guruprasad Singh Professor of Agriculture).	800-40-1,000-E.B.-50-1,250	1948	1,000
Sri Rabindramohan Datta, M.Sc.	250-25-500-E.B.-25-600	1955	325
Dr. Tarakmohan Das ...	Do.	1957	325

#### Laboratory Staff

Roy, Sri Ajoykumar ...	70-4-110-E.B.-5-180	1955	70
------------------------	---------------------	------	----

### (2) ANTHROPOLOGY

Prof. Kshitiprasad Chattopadhyay, M.Sc. (Cantab.) (University Professor)	800-40 1,000-E.B.-50-1,250	1937	1,000+300
Sri Tarak Ch. Das, M.A. ...	500-25-600	1921	600
Sri Tarak Ch. Raychaudhuri, M.A.	250-25-500-E.B.-25-600	1924	600
Sri Dharanidhar Sen, M.Sc. ...	Do.	1948	360
Sri Gautamsankar Ray, M.Sc.	Do.	1945	300
Dr. Minendranath Bose, M.Sc. D.Phil.	Do.	1938	440+600 per annum for Asutosh Museum.
Dr. S. S. Sarkar ...	Do.	1957	450
Sri Anathnath Chatterji, M.B.B.S.	Fixed	1920	800
Dr. M. L. Chakravarti, M.B., Ph.D.	Part-time	1951	100

#### Laboratory Staff

Bagchi, Sri Tarunchandra M.Sc.	100-10-210-E.B.-10-300-8p. E. 9.-15-330.	1953	115
Ghosh, Sri Tarapada	70-4-110-E.B.-5-180	1942	120
Mukherjee, Sri Baidyanath	Do.	1947	70



Name	Grade Rs.	Year of 1st appointment	Present Salary Rs.
(3) APPLIED MATHEMATICS			
Prof. N. R. Sen, D.Sc., Ph.D. ... (Ghosh Professor)	800-40-1,000-E.B. -50-1,250	1917	1,000+300
Dr. S. Ghosh, D.Sc. ...	250-25-500-E.B.- 25-600	1928	600
Dr. B. S. Ray, M.Sc., Ph.D. ...	Do.	1933	600
Dr. N. N. Sen, D.Sc. ...	Do.	1921	600
Sri P. K. Ghosh, M.Sc. ...	Do.	1950	400
Dr. K. M. Bose, D.Sc. ...	Part-time	1933	200
Dr. S. K. Chakravarty, D.Sc. ...	Do.	1955	150
Sri U. Burman, M.Sc. ...	Do.	1915	100
Dr. B. B. Sen	Part-time	1946	100
Dr. N. L. Ghosh, M.Sc., D.Phil. ...	...	...	Honorary

*Laboratory Staff*

Sanyal, Sri Ritabrata ...	100-10-210-E.B.-10-300- Sp. E.B.-15-330.	1954	120
Banerjee, Sri Sunilkumar ...	70-4-110-E.B.-5-180	1951	86

## (4) APPLIED PSYCHOLOGY

Dr. S. N. Roy ...	250-25-500-E.B.-25-600	1943	325
Sri N. N. Chatterjee, M.Sc. ...	160-10-330	1945	220+18 (I.R.)
Sri S. C. Bisi, M.Sc. ...	Do.	1945	220+18 (I.R.)
Sri Charuchandra Bhattacharyya, M.Sc.—Computer.	Do.	1945	250+18 (I.R.)
Sri Debabrata Banerjee	Do.	1955	160
Sri Arun Sarkar	Do.	1956	160
Sri Subimal Deb ...	Do.	1956	160
Sri Ramanath Kundu ...	Do.	1956	160
Dr. Barin Ghosh, M.B. ...	Fixed	1956	75

*Laboratory Staff*

Mukherjee, Sri Nirmalchandra	70-4-110-E.B.-5-180	1943	112
Kar, Sri Bijaybhushan ...	Do.	1940	90
Pathak, Sri Rathindranath	Do.	1954	70

## (5) BOTANY

(Vacant) ...	800-40-1,000-E.B. -50-1,250		
Dr. I. Banerjee, D.Sc., F.A.Sc. (Offg. Head of the Department)	500-50/2-700	1929	650+100
„ S. M. Sarkar, M.Sc., Ph.D.	500-25-600	1937	550
„ S. N. Banerjee, D.Sc.	250-25-500-E.B.-25-600	1940	460
Sri J. K. Sen, M.Sc. (on Leave)	Do.	1948	320
„ A. K. Sarma, M.Sc.	Do.	1948	300
Dr. N. K. Chatterjee, (Temp.)		1956	250
„ H. L. Chakravorty, D.Sc.		...	Honorary
„ J. C. Sengupta, M.Sc., Ph.D.		...	Do.
„ J. K. Chaudhuri, M.Sc., Ph.D.		...	Do.
„ K. P. Biswas, D.Sc.		...	Do.
Rose, Sri Praphullakumar ...	160-10-330	1920	250

Name	Grade Rs.	Year of first appointment	Present salary Rs.
<i>Laboratory Staff</i>			
Chatterjee, Sri Akshaykumar, B.A.	70-4-110-E.B.-5-180	1941	110
Pal, Sri Prakaschandra ...	Do.	1934	108
Ray, Sri Dhurjatibbushan ...	Do.	1936	125
(6) GEOLOGY			
Prof. N. N. Chatterjee, M.Sc. (University Professor)	800-40-1,000-E.B. -50-1,250	1926	900
Dr. S. N. Sen, D.Sc. (on leave without pay)	250-25-500-E.B.-25-600	1947	400
Sri A. Chaudhuri, M.Sc.	Do.	1948	320
„ S. K. Raychaudhuri, M.Sc.	Do.	1948	320
„ Aniruddha De, M.Sc.	Do.	1954	300
„ Indranil Banerjee (Temp.)	...	1957	250
„ H. Sen (Temp.)	...	1956	250
„ P. C. Datta, M.Sc.	Hony. Lecturer	...	...
„ S. K. Ray, M.Sc.	Do.	...	...
„ Sudhish Ch. Guha ...	160-10-330	1952	170
<i>Laboratory Staff</i>			
Chakravorty, Sri Manujendra ...	100-10-210-E.B.-10- 300-Sp. E.B.-15-330.	1956	100
Sengupta, Sri Kananbehari ...	Do	1956	100
Ghosh, Sri R. R. ...	70-4-110-E.B.-5-180	1956	74
Kundu, Sri Bisweswar ...	Do.	1949	78
Ray, Sri Ramanimohan ...	Do.	1939	98
(7) GEOGRAPHY			
Prof. S. P. Chatterjee M.Sc., Ph.D., T.D., D.Lit., F.G.S. (University Professor)	800-40-1,000-E.B. -50-1,250	1937	1,000
Sri N. K. Bose, M.Sc.	500-25-600	1938	525
Dr. B. N. Mukherjee, M.Sc., Ph.D.	250-25-500-E.B.-25-600	1939	500
Sri D. R. Mitra, M.A., Barrister-at-Law.	Do.	1939	500
„ K. G. Bagchi M.A. ...	Do.	1940	380
„ R. Lahiri, M.Sc.	Do.	1950	390
Dr. Meera Guha, M.A., Ph.D.	Do.	1952	280
„ B. Seth, M.A., Ph.D.	Part-time	1952	100
„ S. B. Chatterjee, M.Sc., D.Phil.	160-10-330	1946	280 + 18 (I.R.)
<i>Laboratory Staff</i>			
Miss Usha Sen, M.A. ...	100-10-210-E.B.-10-300-Sp. E.B.-15-330.	1952	180
Mukherjee, Sri Debnath ...	Do.	1954	140
Das, Sri Dhirendranath ...	70-4-110-E.B.-5-180	1941	94
Ray, Sri Lal Mohan ...	Do.	1946	98
Ray, Sri Nanigopal ...	Do.	1947	86
Ray, Sri Atulkrishna ...	Do.	1947	86
Sengupta, Sri H. P.	Do.	1953	70
Chaudhuri Sri Sahikumar ..	Temp.	1956	55
Ghosh Sri Satvaranian ...	Fixed	1956	50

Name	Grade Rs.	Year of first appointment	Present salary Rs.
(8) PSYCHOLOGY			
Prof. Suhrit Ch. Mitra, M.A., D.Phil. (Leipzig.), F.N.I. (University Professor)	800-40-1,000-E.B. -50-1,250	1920	1,000
Sri Sudhirkumar Bose, M.Sc., M.A. (on leave).	500-25-600	1932	500
Dr. Suhrit Ch. Sinha, D.Sc.	Do.	1943	525
Sri Kshirodchandra Mukherjee, M.A.	250-25-500-E.B.-25-600	1943	600
Sri Anathnath Datta, M.Sc.	Do.	1935	275
Dr. D. L. Ganguli, D.Sc.	Do.	1951	425
Dr. Nagendranath De, M.B., M.R.C.P., D.T.M.	Part-time	1946	100
Dr. Bonbehari Chatterjee, M.Sc.	Fixed	1938	50
Sri Ramgovinda Chatterjee, M.Sc.	160-10-330	1952	170
Sri Manindranath Samanta, M.Sc.	Do.	1923	270

*Laboratory Staff*

Bhattacharyya, Sri Tarapada	100-10-210-E.B.-10-300- Sp. E.B.-15-330.	1919	260
-----------------------------	---	------	-----

## (9) PHYSIOLOGY

Prof. B. B. Sarkar, D.Sc., F.R.S.E. (University Professor)	800-40-1,000-E.B. -50-1,250	1922	1,000
Sri P. B. Sen, M.Sc.	... 500-25-600	1927	600
„ N. N. Das, M.Sc., M.B.	... 250-25-500-E.B.-25-600	1945	550
Dr. S. R. Maitra, D.Sc., D.Phil.	Do.	1941	320
B. Mookerjee, D.Sc., M.D.	Hony Lecturer		
S. C. Sen, M.Sc.	Do.		
Sri B. K. Mitter, M.Sc.	Do.		
P. K. Banerjee, M.Sc.	Do.		
A. K. Mukherjee, M.Sc.	Do.		
G. N. Bera, M.Sc.	Do.		
B. B. Chatterjee, M.Sc., M.B.	Do.		
S. Banerjee, D.Sc., M.B.	Do.		
D. P. Sadhu, M.Sc., M.B.	Do.		
B. B. Sen, M.Sc., M.B.	Do.		
R. Ghoshal, M.Sc., M.B., D.T.M.	Do.		
Phanindramohan Sahachaudhury, M.Sc.	160-10-330	1939	170

*Laboratory Staff*

Ghosh, Sri Nripendranath	100-10-210-E.B.-10-300- Sp. E.B.-15-330.	1956	100
Chatterjee, Sri Sanatkumar, B.Sc.	70-4-110-E.B.-5-180	1953	70
Majumdar, Sri Mani	... Do.	1948	78
Koley, Sri Biswanath, M.Sc. (Temp.)		1956	55

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
(10) PHYSIOLOGY			
<b>B.Sc.</b>			
Sri Sujitkumar Mahalanobis, M.Sc.	250-25-500-E.B.-25-600	1914	260
Dr. Bonbehari Chatterjee, M.Sc., M.B.	Fixed	1929	150+18 (I.R.)
Sri Amiyakumar Dasgupta	160-10-330	1953	160

(11) PURE CHEMISTRY			
Prof. B. N. Ghosh, D.Sc. ... (Palit Professor)	800-40-1,000-E.B.-50-1,250	1935	1,000
Prof. J. C. Bardhan, D.Sc. ... (Khaira Professor)	Do.	1924	1,000
Prof. P. B. Sarkar, Dr-es-Sc. A.I.C. (Ghose Professor)	Do.	1916	1,000
Dr. Asima Chatterjee, D.Sc.	500-50/2-700	1954	550
„ N. K. Datta, D.Sc.	500-25-600	1946	525
Dr. S. Basu, D.Sc. ...	Do.	1954	525
Dr. K. C. Bhattacharyya, 2 D.Sc.	25-500-E.B.-25-600	1946	460
Dr. B. Dassarma, M.Sc., D.Phil.	Do.	1950	340
Dr. D. Nasipuri, M.Sc., D.Phil.	Do.	1950	300
Sri N. G. Chakravarti, M.Sc. ...	Hony. Lecturer		
Dr. S. C. Sen, D.Sc. ...	Do.	..	...
Sri S. K. Nandi, M.Sc.	Do.	...	...
Dr. Miss K. K. Rohatgi, D.Sc.	Do.	...	...
Sri B. C. Purkayastha, M.Sc.	Do.	...	...
Dr. P. C. Rakshit, M.Sc., Ph.D.	Do.	...	...
Dr. N. Ray, D.Sc. ...	Do.	...	...
Dr. Miss Manisha Basu, M.Sc. Research Assistant)	150-15-300	1950	225
Sri Nripendranath Ghosh, M.Sc.	Do.	1934	315

*Laboratory Staff*

Dasgupta, Sri Susilkumar, B.Sc.	100-10-210-E.B.-10-800-Sp. E.B.-15-330.	1949	120
Datta, Mrs Chhabi, M.Sc.	Do.	1953	230
Sarkar, Sri Nirmalkumar, B.Sc.	Do	1946	150
Bhattacharyya, Sri Prangopal (Temp.)	...	1956	80
Dasgupta, Sri Rankim	70-4-110-E.B.-5-180	1954	70
De, Sri Susilkumar	Do.	1951	90
Maiti, Sri Gopalchandra	Do.	1955	70
Majumdar, Sri Bimalapada	Do.	1936	98
Mitra, Sri Dilipkumar	Do.	1951	74
Das, Sri Kamalkrishna (Temp.)	...	1950	55

Name	Grade Rs.	Year of first appointment	Present salary Rs.
(12) PURE PHYSICS			
Prof. B. D. Nagchaudhury, D.Sc., (Palit Professor)	800-40-1,000-E.B.- 50-1,250.	1933	950
Prof. S. N. Bose, M.Sc. (on leave) (Khaira Professor)	Do.	1945	1,000+300
Prof. J. N. Bhaer, D.Sc. (Ghose Professor)	Do.	1949	850
Dr. P. C. Bhattacharyya, D.Sc. (Offg. Head)	500-25-600	1949	525+100
Dr. S. D. Chatterjee, D.Sc.	Do.	1951	525
Dr. K. Dasgupta	Do.	1952	500
Sri S. Dattamajumdar, M.Sc.	250-25-500-E.B.- 25-600.	1951	400
Dr. T. C. Roy	Temp.	1956	340
Dr. K. C. Kar	Part-time	1940	200
Dr. B. C. Guha, D.Sc.	Do.	1953	100
Sri B. M. Banerjee, M.Sc.	Hony. Lecturer		
Dr. R. L. Sengupta	Do.	...	...
Dr. P. K. Sen, M.Sc., D.Phil.	Do.	...	...
„ N. N. Dasgupta, Ph.D.	Do.	...	...
„ A. Saha, D.Sc.	Do.	...	...
„ S. Ghosh, M.Sc., D.Phil.	Do.	...	...
Sri S. Das, M.Sc.	Do.	...	...
Sri Subhrendu Kar	160-10-330	1951	170
Sri Prabhatkumar Deb, M.Sc.	Do.	1951	170
Sri Bimalendranath Chakravarti, M.Sc.	Do.	1953	170
Sri Sivabrata Bhattacharyya, M.Sc., Research Assistant.	150-15-300	1952	240
Laboratory Staff			
Das, Sri Manmathanath	100-10-210-E.B.-10-300-Sp. E.B.-15-330.	1925	190
Mookerjee, Sri Amalkrishna	Do.	1936	220
Bhattacharyya, Sri Anilkumar	70-4-110-E.B.-5-180	1940	106
Ghosh, Sri Manmohan, B.Sc.	Do.	1938	135
Patra, Sri Nandalal	Do.	1943	125
Sinha, Sri Nabskumar	Do.	1946	125+15 (allowance)
Datta, Sri Bimal	Do.	1955	70
Saha, Sri Brajamohan	Do.	1957	55
Palchaudhuri, Sri Narayan- chandra	85-4/2-75-5-85	1947	70
Workshop			
Banerjee, Sri Rameschandra	100-10-210-E.B.-10-300- Sp. E.B.-15-330	1947	220
Das, Sri Jitendranath	70-4-110-E.B.-5-180	1938	125
Das, Sri Asutosh	Do.	...	70
Debnath, Sri Abhaycharan...	Do.	1954	70
Debnath, Sri Mahadeb	Do.	1940	94
Nath, Sri Maniklal	Do.	1925	110
Bose, Sri Ramratan	Do.	1952	70

Name	Grade Rs.	Start tment	Present Salary Rs.
(13) PURE MATHEMATICS			
Prof. Rabindranath Sen, M.A., Ph.D., (Hardinge Professor)	800-40-1,000-E.B. -50-1,250	1933	950
Dr. Amalchandra Chaudhury, M.Sc., D.Phil.	500-25-600	1938	525
Dr. H. M. Sengupta, M.A., Ph.D.	Do.	1952	525
Dr. Mahadev Dutta, M.Sc., D.Phil.	250-25-500-E.B.-25-600	1954	400
Sri Bankimchandra Chatterjee, M.Sc.	Do.	1948	420
„ Manindrachandra Chaki, M.A.	Do.	1952	400
Sri P. L. Ganguli, M.A.	Do.	1955	325
Rev. F. Goreux (Part-time)	...	1955	100
Sri M. N. Ratchaudhury, M.Sc.	...	1955	Honorary
Sri N. C. Basumajumdar, M.Sc.	...	1955	Do.
Office			
Mukherjee, Sri K. C.	70-4-110 E.B.-5-180	1955	70
(14) STATISTICS			
Dr. P. K. Bose, M.Sc., D.Phil. (Head of the Department.)	500-50/2-700	1943	650
Sri H. K. Nandi, M.Sc.	.. 250-25-500-E.B.-25-600	1943	360
Dr. M. Ghosh, M.A., Ph.D.	Do.	1944	340
Dr. B. N. Ghosh.	...	...	420
Sri A. C. Nag, M.Sc.	.. Part-time	1949	100
Dr. Kailasnath Bhattacharyya, D.Phil.	Do.	1954	100
Sri S. B. Chaudhuri, M.Sc.	.. Do	1953	100
Dr. K. C. Seal, M.Sc., A.M., Ph.D.	Do.	...	100
Sri P. K. Banerjee	..	...	Honorary
Sri B. N. Ghosh, M.Sc.	..	...	Do.
Office Staff			
Bose, Sri Nirmalendu	70-4-110-E.B.-5-180	1946	115
Sarkar, Sri Kshitishandra	Do.	1946	86
(15) ZOOLOGY			
Prof. J. L. Bhaduri, D.Sc. (Sir Nilratan Sircar Professor)	800-40-1,000-E.B.-50-1,250	1933	
Sri D. Mukherji, M.Sc.	500-25-600	1923	600
Dr. S. P. Raychaudhuri, M.Sc., Ph.D.	Do.	1944	500
Sri G. K. Chakravarti, M.Sc.	250-25-500-E.B.-25-600	1932	460
Dr. D. N. Ganguli, M.Sc., D.Phil.	Do.	1945	420

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
Dr. A. K. Ghosh, D.Phil.	250-25-500-E.B.-25-600	1957	850
Sri M. M. Chakravarti, M.Sc.	Do.	1936	460
„ N. V. Bhaduri, M.Sc., M.B.		1944	Hony. Lecturer
Dr. P. Sen, M.Sc., Ph.D., D.I.C.		1944	Do.
Dr. S. N. Banerjee, Ph.D.			Do.

*Laboratory Staff*

Banerjee, Sri	100-10-210-E.B.-10-300-	1954	120
Prasanta, M.Sc.	Sp.E.B.-15-330		
Sen, Sri Kanailal, B.Com. ..	Do.	1938	160
Lahiri, Sri Ramdulal, B.Sc.	70-4-110-E.B.-5-180	1937	140
Parui, Sri Upendranath ...	Do.	1932	130
Raychaudhuri, Sri Manoranjan, M.Sc.	Do.	1945	140
Saha, Sri Amiyakumar ...	Do.	1947	102

**III. University College of Technology Department****(1) APPLIED CHEMISTRY**

Prof. B. C. Guha, D.Sc., Ph.D.	800-40-1,000-E.B.	1936	1,000+300
(Ghose Professor)	-50-1,250		
Dr. S. K. Mukherjee, D.Sc.	500-25-600	1946	525
Sri K. L. Ray, M.Sc.	Do.	1950	525
„ B. K. Ganguli, M.Sc.	250-25-500-E B.-25-600	1950	250
Dr. B. C. Pathak	Do.		400
„ D. Sen	Do.	1956	350
Sri Gopalchandra Bhattacharyya	Do.	1956	300
Dr. B. L. Nandi, Ph.D.	Honorary Lecturer		
„ A. Bose, Ph.D.	Do.	...	...
„ P. N. Sengupta, D.Phil.	Do.	...	...
„ D. C. Tapadar, M.Sc., D.Phil.	Do.	...	...
Sri S. Chatterjee, M.Sc.	Do.	...	...
Dr. D. K. Chaudhuri, D.Phil., Ph.D.	Do.	...	...
„ P. K. Sanyal, Ph.D.	Do.	...	...
„ D. K. Ray, D Phil.	Do.	...	...
Sri B. K. Mukherjee, M.Sc.	Do.	...	...

*Laboratory Staff*

Ghosh, Sri Sitalchandra ...	100-10-210-E.B.-10-300-	1944	240
	Sp.E.B.15-330		
Ray, Sri Hemantakumar ...	Do.	1944	170
Das, Sri Nirodkumar ...	Do.	1923	200
Bhattacharyya, Sri Sureswar	70-4-110-E.B.-5-180	1953	70
Das, Sri Gopalchandra ...	Do.	1943	86
Das, Sri Panchulal ...	Do.	1945	99
Das, Sri Ratnakar ...	Do.	1957	70
Hath, Sri Kanailal ...	Do.	1932	130
Samanta, Sri Panchanan ...	Do.	1940	113
Sinha, Sri Ajoykumar ...	Do.	1957	70

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
<i>Bio-Chemistry</i>			
Dasgupta, Sri Tamalkumar	100-10-210-E B.-10-300- Sp. E.B.-15-330	1956	100
Roy, Sri Nripendrakumar	Do.	1956	100
<i>Applied Chemistry</i> (Expansion Scheme)			
Dr. S. C. Neogi, D.Sc. ...	500-50/2-700	1939	650
„ S. C. Ray, D.Sc. ...	500-25-600	1950	600
„ D. Lahiri, D.Sc. ...	Do.	1950	525
Dr. M. M. Chakravorty, D.Sc.	Do.	1945	525
Sri A. S. Bhaduri, M.Sc., M.S.	250-25 500-EB -25-600	1952	420
Dr. S. Mukherjee, D.Sc. (on leave without pay).	Do.	1950	400
Sri A. Ghoshal, M.Sc (Temp.)	Do.	1957	250
Dr. S. K. Bose, D.Sc. ...	Do.	1950	440
„ A. Saha, M.Sc., D.Phil.	Do.	1950	500
„ P. K. Chaudhuri, M.Sc., D.Phil. (on study leave-)	Do.	1950	460
„ N. K. Bose, M.Sc., M.S.Sc.	Do.	1953	380
Sri Hemendranath Das- gupta.	160-10-330	1944	220
<i>Laboratory Staff</i>			
Datta, Sri Debesh Ch. ..	100-10-210-E.B-10-300- Sp. E.B.-15-330	1950	110
Mukherjee, Sri Ranjit ..	Do.	1952	100
Roy, Sri Kunalbhusan .	Do.	1956	100
Sen, Sri Asiskumar .	Do.	1956	110
Banerjee, Sri Sibsankar .	70-4-110-E.B.-5-180	1954	118
Goswami, Sri Makhanlal .	Do	1950	94
Maitra, Sri Santoshkumar .	Do.	1953	113
Ray, Sri Debendrachandra	Do.	1951	125
Sen, Sri Asutosh	Do.	1952	120

## (2) APPLIED PHYSICS

Prof. A. K. Sengupta, D.Sc., 800-40-1,000-E.B.-50-1,250	1935	880
(Ghose Professor).		
Sri H. N. Bose, M.Sc. (on leave)	250-25-500-E.B.-25-600	1948
Dr. Karunes Bandyopadhyay, B.Sc. (Glasgow), D.Phil.	Do.	1950
Sri M. Dey, M.Sc. ...	Do.	1950
Sri S. R. Das, M.Sc. (on study leave).	Do.	1950
Sri L. M. Roy (in place of Sri H. N. Bose)	Do.	1955



Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
Sri A. K. Ghosh, M.Sc. ...	Hony. Lecturer	1951	...
Sri B. N. Chaudhuri, M.Sc. ...	"	1951	...
Sri J. D. Gupta, M.Sc. ...	"	1951	...
Sri D. C. Roy, M.Sc. ...	"	...	...
Sri D. D. Majumdar, M.Sc. ...	"	...	...
Dr. M. Datta, D.Sc. ...	"	...	...
Sri Bimalkumar Nath, M.Sc. ...	160-10-330	1951	170

*Laboratory Staff*

Samanta, Sri Satyendranath	100-10-210-E.B.-10-300. Sp. E B.-15-330	1926	170+30
Samanta, Sri Balaram ...	70-4-110-E.B.-5-180	1941	125
De, Sri Ramchandra ...	Do.	1955	70
Guchit, Sri Nityananda ...	Do.	1935	102
Goswami, Sri Bijaykrishna	Do.	1938	113
Ganguli, Sri Sailendranath	Do.	1950	120
Guyen, Sri Nagendranath	Do.	1944	74
Mitra, Sri Sadhucharan ...	Do.	1950	94
Mandal, Sri Nilmani ...	Do.	1942	113
Nag, Sri Nitailal ...	Do.	1923	125+10
Nandi, Sri Kanailal ...	Do.	1915	113
Sarkar, Sri Anulyacharan...	Do.	1929	125+6

*Applied Physics*

## (Expansion Scheme)

Sri D. B. Sinha, M.Sc. ...	500-25-600	1950	525
Dr. Girindranath Bhatta- charyya, M.Sc.	Do.	1952	550
Sri Priyatosh Sen, M.Sc. ...	250-25-500-E.B.-25-600	1948	440
Sri M. N. Roy, M.Sc. ...	Do	1951	450
Sri Srikrishnaprasad Bhatta- charyya, D.Sc.	150-15-300	1950	300
Sri Gobindalal Dey, M.Sc.	Do.	1950	300
Sri Ajoykumar Sen, M.Sc.	Do.	1954	195

*Laboratory Staff*

Gubathakurta, Sri Madhab- lal, B.Com.	100-10-210-E B.-10-300- Sp.E.B.-15-330	1942	190
Kundu, Sri Indrakumar ...	Do.	1944	170
Chaudhuri, Sri Prabir- chandra	70-4-110-E.B.-5-180	1952	74

## (3) RADIOPHYSICS AND ELECTRONICS

Dr. J. N. Bhar, D.Sc.	(Shown under Pure Physics)		
S. Deb, M.Sc.	500-50/2-700	1951	550
Sri A. Chaudhuri, M.Sc.	250-25-500-E.B.-25-600	1948	300
Dr. M. K. Dasgupta, M.Sc.	Do.	1954	375
" M. S. Bose, M.Sc.	Do.	1954	275
Sri B. K. Bhattacharyya ...	Do.	1955	260

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
Sri B. K. Nag ...	250-25-500-E.B.-25-500	1956	260
„ S. K. Sen	Do.	1956	250
„ A. N. Daw	Do.	1956	250
„ D. N. Mukherjee, M.Sc.	Part-time Lecturer	1952	100
„ K. K. Bhattacharyya, M.Sc.	Honorary	...	...
„ A. K. Saha, M.Sc.	Do.	...	...
„ S. S. Baral, M.Sc.	Do.	1951	...
„ Asokkumar Sen	150-15-300	1954	180
<i>Laboratory Staff</i>			
Banerjee, Sri Ajitbhushan	100-10-210-E.B.-10-300- Sp. E B -15-380	1947	100
Bose, Sri Gouriasankar ...	Do.	1954	100
Biswas, Sri Pareshnath ...	Do.	1955	100
Burman, Sri Mukulchandra	Do.	1953	100
Chowdhuri, Sri Somes ...	Do.	1923	220
Das, Sri Mukundamadhab	Do.	1957	80
„ Sri Subodhkumar ...	Do.	1955	100
De, Sri Ranjitkumar ...	Do.	1954	100
Maiti, Sri Sulochan ...	Do.	1938	120
Roy, Sri Gopikamohan ...	Do.	1949	100
Saha, Sri Pareshnath ...	Do.	1956	100
Bose Sri Satischandra ..	70-4-110-E B -5-180	1949	86
Chakravarti, Sri Kalisadhan	Do.	1949	102
Das Sri Pareshchandra ...	Do.	1954	102
Das, Sri Pramatthanath ..	Do.	1956	70
Debnath, Sri Haridas ...	Do.	1956	70
De, Sri Dilipkumar ...	Do.	1955	70
Ghosh, Sri Sudhendukumar	Do.	1952	70
Mitra, Sri Sadananda ...	Do.	1954	74
Ray, Sri Jugalkishore ...	Do.	1951	74
Ghosh, Sri Sitalchandra ...	Part-time	...	75(fixed)

## (4) University College of Science Office

## SECRETARY

Sri B. K. Mukherjee, M.Sc., A.R.T.C., D.I.C.	500-50/2-800	1939	750
--	--------------	------	-----

## ASSISTANTS

Pathak, Sri Kalikrishna, B.A.	250-15 400	1924	220
(Superintendent)			
Acharyya, Sri Sudhirchandra, B.A.	110-10-210-E.B.-10-800- Sp. E B.-15-330.	1950	130
Bhattacharyya, Sri Jibankrishna, B.A.	Do.	1950	100
Bose, Sri Bibhutibhushan	Do.	1938	240+15
Chatterjee, Sri Priyatosh, B.A.	Do.	1941	150+19
			Union
Rakshit, Sri Keshabchandra	Do.	1926	+30 (Mess) 260+20
			Union
Ray, Sri Santoshkumar, B.Com.	Do.	1939	170+30
Mukherjee, Sri Biswanath, B.Com.	Do.	1956	100
Dasgupta, Sri Nitip	70-4-110-E.B.-5-180	1943	94

Name	Grade	Year of first appointment	Present Salary
	Rs.		Rs.
<i>(5) Science College (General)</i>			
Mookerjee, Sri Bijankumar.	100-10-210-E B.-10-800-	1944	200+18
	Sp.E.B.-15-350+18 T.T.		
Bhattacharyya, Sri Bimalakanta.	70-4-110-E.B.-5-180	1936	140
Kar, Sri Nilratan	Do.	1936	106+5

#### IV. Domestic Science Training Department

##### *Teaching staff (Whole-time Lecturers)*

Miss J. P. Dasgupta, M.A., B.T., T.D. (Lond.), Reader (Head of the Department).	500-25-600	1937	550
Miss Sovana Ghosh, M.A., B.T., M.Ed.	150-10-300	1944	160
Mrs Bani Sen, B.A., Dip.-in- Home Science, Dip.-in-Teachers' Training in Home Science.	Do.	1947	190
Miss Gouri Sengupta, B.A., Dip.- in Domestic Science (Birmingham)	Do.	1953	160

##### *Teaching Staff (Part-time Lecturers)*

Dr. J. N. De, M.B., D P.H. (Cal.), D.T.M.H. (Lond.).		1948	120
Sri T. P. Biswas (Artist) ...		1951	90
" M. K. Chakravarti, Dip.-in Textile Tech.		1944	70
" P. N. Chobey, M.A. (Double)		1951	65
Dr. S. K. Bose		1955	65

##### *Teaching Staff (Demonstrators)*

Sri Gopal Rath (Cook) ..	35-1-50	1944	50
Sri Harimohan Paul, Potter (Part-time).	...	1947	25

##### *Office Staff*

Das, Sri Santanukumar ...	55-3-85-E.B.-4-125-5-130	1952	70
Chatterjee, Sri Dilipkumar (Temp.)	Fixed	1956	55

#### V. University College of Law

##### *Principal and Head of the Department of Law*

Prof. P. N. Banerjee, M.A., B.L., LL.D., D.Litt., Barrister-at-Law, Vidya- vachaspati.	800-40-1,000- E.B.-50-1,250.	1919	1,250 +250
---	---------------------------------	------	---------------

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
<i>Professors</i>			
Sri Anilchandra Ganguli, B.A., LL.B., Barrister-at-Law.	...	1946	250
Junab Azizul Huq, M.A., LL.B., Barrister-at-Law.	...	1945	250
Sri Asokechandra Sen, M.A., LL.M.	...	1937	250
„ Ajitkumar Dhar, B.A., LL.B., Barrister-at-Law.	...	1953	225
„ Byomkes Basu, M.A., LL.B.	...	1937	250
„ Balailal Pal, M.A., LL.M.	...	1946	250
„ Bholanath Roy, M.A., LL.B.	...	1946	250
„ B. Basu, M.A., Barrister-at-Law.	...	1952	225
„ Bhupalchandra Raychaudhuri, M.A., LL.B.	...	1952	225
Dr. B. N. Mukerjee, M.Sc. (Cal.), D.I.C., Ph.D. (Lond.), Barrister-at-Law.	...	1953	225
Sri Dilipkumar Mitter, M.A., Barrister-at-Law.	...	1953	225
„ Guruprasad Ghosh, M.A., LL.B.	...	1953	225
„ Hemolandra Dhar, M.A., LL.B.	...	1950	225
„ Jajneswar Majumdar, M.A., LL.M.	...	1926	250
„ Kamjit Mookerjee, M.A., LL.B.	...	1953	225
„ Mahendranath Bagchi, B.A., LL.B.	...	1950	250
„ Pratapchandra Chunder, M.A., LL.B.	...	1946	250
„ Prafullakumar Ray, M.A., LL.B.	...	1953	225
„ Ramendramohan Majumdar, M.Sc., LL.B.	...	1924	250
„ Sachindrakumar Ray, M.A., LL.B.	...	1953	225
„ Sadhanachandra Raychaudhuri, M.A., LL.B.	...	1937	250
„ Satyendranath Chatterjee, B.Sc., LL.B., Barrister-at-Law.	...	1953	225
„ Sunilkumar Mitra, M.A., LL.B.	...	1953	225
Janab Syed S. A. Masud, M.A., LL.B., Barrister-at-Law.	...	1945	250
Sri Dipakkumar Sen, B.A., Barrister-at-Law.	...	1953	225
„ Dhireschandra Chakravorti, M.A., LL.B.	...	1953	225
„ Rabindranath Sanyal, B.A., LL.B.	...	1953	225

Name	Grade	Year of first appointment	Present salary
	its.		Its.
Sri Samarendranath Mukherjee, M.A., LL.B.		1953	225
„ Sudhindrakrishna Dutt, M.A. (Oxon.), Barrister-at-Law.		1955	225
„ Chittatosh Mookerjee, M.A. LL.B.		1955	225
„ Dhirendranath Guha Thakurta, M.A. LL.B.		1955	225
„ Nirmalkumar Dey, M.A., LL.B. Barrister-at-Law.		1955	225
„ Amarendranarayan Bagchi, M.A. LL.B.		1955	225
<i>Tutors</i>			
„ Diptendramohan Ghosh, M.A., LL.B.		1955	125
„ Nirmalchandra Chaudhury M.A., LL.B.		1955	125
<i>Office and Library Establishment</i>			
<i>Superintendent.</i>			
Basu, Sri Mrityunjayprasad, B.A., LL.B.	250-15-400+50 allowance	1934	355+50
<i>Librarian.</i>			
Dutta, Sri Kalikumar, B.A., LL.B.	Do	1945	295
<i>Assistants</i>			
Chakrabarty, Sri Bijanbehari	100-10-210-E.B.-10-300-Sp.-E.B.-15-330.	1919	270
Datta, Sri Arunkumar	Do,	1937	110
De, Sri Chandrasekhar	Do.	1938	110
Ghosh, Sri Harendranath	Do.	1925	200
Mitra, Sri Sribhushan	Do.	1919	280+25
Mukherjee, Sri Chandrakanta	Do.	1939	110
Ray, Sri Sibnath	Do.	1919	270+20
Roy, Sri Monotosh	Do.	1946	160
<i>(Physical Instructor)</i>			
Samaddar, Sri Anathbandhu	Do.	1937	110
Ray, Sri Amitkumar	55-130	1957	55

## VI. Departmental Office

### 1. Audit and Accounts Department

#### AUDIT AND ACCOUNTS OFFICER

Grade—250-25-500

Sri Bhupendranath Ghosh, B.Com., G.D.A.	1954	450
---	------	-----

#### SUPERINTENDENT AND ACCOUNTANT

Grade—250-10-400

Majumdar, Sri Punyabrata, M.A. (Com.)	1956	260
---------------------------------------	------	-----

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
<b>ASSISTANTS</b>			
<b>Grade—100-10-210-E.B.-10-300-Sp.E.B.-15-330</b>			
Banerjee, Sri Jogeshchandra	...	1942	100
Bhattacharyya, Sri Nirmalkumar, B.Com.	...	1948	120
Bose, Sri Lalmoan, B.A.	...	1946	120
Bose, Sri Amalkumar	...	1935	220
Chakrabarti, Sri Radhashyam, M.A. (Com.)	...	1947	120
Chatterjee, Sri Sudhirkumar	...	1928	240
Dutta, Sri Debidas, B.Com.	...	1952	210
Halder, Sri Harendrakrishna, B.A.	...	1931	240
Maitra, Sri Sudhirkumar, B.Sc.	...	1927	270
Majumdar, Sri Kalyankumar, B.Com.	...	1936	190
Raichowdhury, Sri Bholanath, B.Com.	...	1952	240

**Grade—70-4-110-E.B.-5-180**

Banerjee, Sri Hirendranath, B.Com.	...	1953	78
Bose, Sri Sudhinchandra, B.Com.	...	1955	74
Dasgupta, Sri Chittaranjan, M.A. (Com.)	...	1954	78
Datta, Sri Manishchandra, B.Sc.	...	1956	70
De, Sri Ajitkumar, B.Com.	...	1956	74
Dutt, Sri Biswanath, B.Com.	...	1953	78
Dutt, Sri Aswinikumar	...	1943	94
Dutt, Sri Lalmanik	...	1947	86
Ghosh, Sri Dulalchandra, B.Com.	...	1955	74
Ghosh, Sri Haridas, B.Com.	...	1953	78
Ghosal, Sri Sunilkumar	...	1954	70
Guptabhaya, Sri Ratindranath, B.A., B.Com.	...	1954	78
Mitra, Sri Gopinath, B.Com.	...	1955	74
Palodhi, Sri Ramgati	...	1927	125
Roy, Sri Senatkumar, B.Com.	...	1955	74
Sanyal, Sri Nirmalya, B.Com.	...	1953	78
Sen, Sri Ajitkumar, B.Com.	...	1954	78

**Internal Auditor****Grade—250-10-400**

Roy, Sri Radhashyam B.Com., A.C.A. (Internal Auditor).	1956	250
---	------	-----

**Audit Assistant****Grade—100-10-210-E.B.-10-300-Sp.E.R.-15-330**

Roy, Sri Rathindranath, B.Com.	1953	100
--------------------------------	------	-----

**2. Appointment and Information Board and Students' Advisory Bureau.  
(Overseas).**

Raychaudhuri, Sri Mahimamukul, B.Com.	fixed	1956	500
D.S.Sc. (Glas.), D.V.G. (Lond.), M.B.I.M. (Eng.), M.N.I.I.P. (Lond.), Secretary.			

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
<i>Assistants</i>			
Grade—100-10-210-E.B.-10-300-Sp.E.B.-15-330			
Chatterjee, Sri Pareeshchandra	Do.	1926	260
Ghosh, Sri Jaynewar, B.A.	Do.	1939	170
Ray, Sri Nitaichandra	70-4-110-E.B.-5-180	1953	70
Banerjee, Sri Sailendrachandra (Temp.)	fixed	1956	55
<b>3. Asutosh Museum</b>			
Sri Debprasad Ghosh, M.A. (Curator).	500-50/2-700 +75 (C.A.).	1937	700+75 (C.A.)
Sri Kurjagovinda Goswami, M.A., Excavation Officer.		1933	Honorary
Dr. Kalyankumar Ganguli, M.A. D.Phil			Do.
Sri Pareesh Ch. Dasgupta, M.A. (Asst. Curator).	100-10-210-E.B.-10-300-Sp.E.B.-15-330.	1955	220
Dr. Minendranath Basu, M.Sc., D.Phil., Chemist-in-charge.	...	1940	Allowance of Rs. 600 annually.
<i>Office</i>			
Basu, Sri Abhinndranath, B.Com.	100-10-210-E.B.-10-300-Sp.E.B.-15-330.	1952	200
Nath, Sri Jitendranath	... 70-4-110-E.B.-5-180	1928	106
Pal, Sri Prankrishna	... Do.	1940	108
Sarkar, Sri Krishnachandra	... Do.	1940	120
<b>4. Board of Health Department</b>			
Sri A. N. Chatterji, M.B.B.S., Medical Adviser and Secretary, Board of Health.	...	1920	300+125 C.A.
<i>Medical Examiners</i>			
Sri Gopalchandra Sen, M.B.B.S., D.O.M.S., After-care Officer.		1950	125
Lt.-Col. B. P. Sur, M.B.B.S. (Cal.) M.R.C.P., M.R.C.S. (Eng.), L.R.C.P. (Lond.), After-care Officer.		1932	125
Sri A. C. Roy, M.B.B.S.		1933	100
Sri S. P. Chakravorti, M.B.B.S.		1937	100
Sri Dwijendranath Guha, M.B., D.O-M.S.		1955	100
Capt. R. N. Banerjee, M.B.B.S.		1955	100
Sri Sunilkumar Gupta, M.B.B.S.		1955	100
<i>Lady Medical Examiner</i>			
Sm. Indurekha Roy, M.B.B.S.		1951	100
<i>Office Staff</i>			
Banerjee, Sri Kalidas, M.A., LL.B. (Retired from 1st October, 1955).	100-10-210-E.B.-10-300-Sp.E.B.-15-330.	1921	280
Chatterjee, Sri Sailendranath, B.A.	Do.	1928	260

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
Chakravarti, Sri Provatchandra, 100-10-210-E.B.-10-300- B.Sc.	Sp. E.B.-15-330	1933	240
Pal, Sri Amulyacharan (Typist and General Asstt.).	Do.	1938	24
Amboli, Sri Manikchander, B.Sc. (Temp.).		1956	55
Roy, Sri Ramendranath, B.A.	"	1956	55
<b>5. Calcutta Review Office</b>			
Sri Bimalendu Kayal, M.A., Manager.	...	1935	115
Grade—100-10-210-E.B.-10-300-Sp.E.B.-15-330			
Banerjee, Sri Mahimaranjan ...	...	1923	260
Grade—70-4-110-E.B.-5-180			
Chatterjee, Sri Dinanath		1934	98
<b>6. Calcutta University Press</b>			
Sri Sibendranath Kanjilal, B.Sc., Dip.in-Print. (Man- chester), Superintendent.	200-10-300-15-450	1937	450+100 Confidential Allowance
Sri Ramkrishna Chakravarty, M.A., Asstt. Superintendent (Publication).	200-10-350	1927	300
„ Kamalkumar Ghosh, M.A., Assistant Superintendent (W&P), Temporary.	Do.	1952	210
Guha, Sri Dhirendrakumar, B.A. (Overseer).	100-10-210-E.B.-10- 300-Sp.E.B.-15-330	1924	300
Bhattacharya, Sri Asutosh, B.A. (Temp.)	Do.	1953	200
<i>Assistants</i>			
100-10-210-E.B.-10-300-Sp.E.B.-15-330			
Banerjee, Sri Kalidas, B.A., LL.B.	Do.	1926	260
Banerjee, Sri Sachindralal, B.Com.	Do.	1939	180
Bhattacharyya, Sri Binaykrishna	Do.	1923	230
Bhattacharyya, Sri Nalinikanta, B.A.	Do.	1953	100
Bhattacharyya, Sri Niranjan, B.Com.	Do.	1958	120
Das, Sri Jyotirmay, B.Com.	Do.	1945	110
Dutt, Sri Harischandra ...	Do.	1925	260
Dutt, Sri Jogendranath ...	Do.	1925	260+15 Allowance
Guin, Sri Manimohan, B.A. ...	Do.	1950	120
Gupta, Sri Sureschandra ...	Do.	1932	220
Mookerjee, Sri Kalprasanna ...	Do.	1922	260
Mookerjee, Sri Kamalkumar ...	Do.	1939	160+25 Allowance
Mukherjee, Sri Taradas ...	Do.	1941	150
Nag, Sri Nityananda, B.Com....	Do.	1939	150
Pal, Sri Arabinda, M.A. ...	Do.	1936	170
Roy, Sri Pratapchandra ...	Do.	1929	230+15 Allowance
Sadhu, Sri Umapada ...	Do.	1924	260



Name	Grade	Year of first appointment.	Present salary.
	Rs.		Rs.
Banerjee, Sri Anilkumar ...	70-4-110-E.B.-5-180	1936	106
Banerjee, Sri Bibhutibhusan ...	Do.	1934	135
Banerjee, Sri Sailendranath, B.Sc.	Do.	1953	78
Bera, Sri Kalikrishna ...	Do.	1941	90
Bose, Sri Rabindranath ...	Do.	1916	106
Chakrabarty, Sri Sachindrakumar	Do.	1947	74
Chakrabarti, Sri Ramkrishna	Do.	1936	126
Das, Sri Amiyaprasad	Do.	1955	70
Ghosh, Sri Pinski, B.Sc.	Do.	1953	78
Ghosh, Sri Debiprasad, M.A. (Com.)	Do.	1950	82
Roy, Sri Ajoy ...	Do.	1946	99

*Lino Operators*

Chatterjee, Sri Prabhatkumar ...	125-4-205-5-225	1945	165+20
Gomes, B. J. ..	Do.	1952	137
Mukherjee, Sri Bishnupada ...	Do.	1938	149
Mullick, Sri Dhruva ...	Do.	1951	125
Roy, Sri Sachindramohan ...	Do.	1950	125

*Mono Operators*

Bhattacharyya, Sri Dibakar ...	125-4-205-5-225	1950	125
Goswami, Sri Prabodhchandra	Do.	1951	169
Nath, Sri Sukdev ...	Do.	1948	125

*Thompson Operator*

Chakravorty, Sri Khagendranath	70-8-118-4-150	1927	126
--------------------------------	----------------	------	-----

**7. Central Library Department**

Sri Pramilechandra Bose, B.A. 200-20-500-25-600	1935	600
(Hons.), Dip. Lib. (B.L.A.), Librarian.		
„ Subodhkumar Mukherjee, 150-15-300-20-400	1938	380
M.A., LL.B., Dip. Lib. (Imperial Library, Calcutta), Deputy Librarian.		
„ Sibsankar Mitra, M.A., LL.B., 200-10-300	1954	220
Cert. in Librarianship (B.L.A.). Assistant Librarian.		
„ Susanta Sengupta, M.A., „	1955	200
Dip.Lib. (Calcutta), Assistant Librarian.		
Banerjee, Sri Arunoday 100-10-210-E.B.-	1924	260
10-300-Sp.E.B.-15-330.		
Banerjee, Sri Asimchandra, 1939		170
B.A., Dip. Lib. (Calcutta University.)		
Banerjee, Sri Baidyanath, 1936		180
Cert. in Lib. (B.L.A.) & Archives keeping—Govt. of India.		
Chakraborty, Sri Chittaranjan, 1938		190+25
B.A., Lib. Training Certifi- cate, (B.L.A.), Dip.Lib. (Cal. Uni.).		Allowance for Diploma Course.
Chakraborty, Sri Radhikaranjan 1928		260

Name	Grade	Year of first appointment.	Present salary.
	Rs.		Rs.
Deb, Sri Amalendukumar, Lib. Training Certificate, (B.L.A.).	100-10-210-E.B.-10-800-Sp.E.B.-15-830.	1947	170
Halder, Sri Prodyotkumar, B.A.		1925	260
Mukherjee, Sri Rajkumar, M.A., Dip Lib. (Imperial Library, Calcutta).		1946	230
Praumanik, Sri Surathkumar, B Com., Lib. Training Certificate (B.L.A.), Dip.Lib. (Cal. Uni.).		1937	180
Roy, Sri Manujendrakumar, B.A., Lib. Training Certificate (B.L.A.), Dip.Lib. (Cal. Uni.).		1945	200
Roychoudhury, Sri Kasiprosad, Lib. Training Certificate (B.L.A.).	"	1919	260+20 allowance
Nasir Ahmed Khan (Temporary)	No grade	1952	80
Banerjee, Sri Kumarendra, Lib Training (B.L.A.).	70-4-110-E.B.-5-180	1948	74
Banerjee, Sri Nilambar ...	"	1933	98
Banerjee, Sri Pannalal, Lib. Training (B.L.A.).	"	1947	86
Bhattacharyya, Sri Saktipada ...	"	1924	110
Bhattacharyya, Sri Sudhirkumar	"	1944	86
Chatterjee, Sri Souendranath	"	1948	78
Das, Sri Nitaichandra ...	"	1936	98
De, Sri Debendranath ...	"	1918	120
Dutta, Sri Tarinikanta, Lib. Training Certificate (B.L.A.).	"	1936	120
Ghose, Sri Phanibhushan ..	"	1921	120
Ghose, Sri Sambhunath ...	"	1927	110
Maitty, Sri Dharanidhar ...	"	1939	90
Mukherjee, Sri Ramapati ...	"	1936	94
Nath, Sri Shyamsundar ...	"	1950	74
Singh, Sri Mathuraprosad ...	"	1939	94
Sett, Sri Nareschandra (Temporary)		1956	70

### 8. Controller's Department

#### CONTROLLER OF EXAMINATIONS

Grade—Rs. 750-50/2-1,000

Dr. Nareschandra Ray, M.A., Ph.D.	1937	950
-----------------------------------	------	-----

#### DEPUTY CONTROLLER OF EXAMINATIONS

Grade—Rs. 500-50/2-700

Sri Arunkumar Roy, M.Sc.	...	1951	550
--------------------------	-----	------	-----

Name	Grade Rs.	Year of first appointment	Present salary Rs.
<b>ASSISTANT CONTROLLER</b>			
Grade—Rs. 250-25-500			
Sri Bajaybhushan Banerjee, M.A., D. Phil.	...	1955	375
<b>SUPERINTENDENT</b>			
Grade—Rs. 250-15-400			
Sri Jagannathdeb Roy, B.A. up to 28-3-57.	...	1918	330
Banerjee, Sri Debaprasad, B.A. from 27-4-57.	...	1937	250
<b>ASSISTANTS</b>			
Grade—100-10-210-E.B.-10-300-Sp.E.B.-15-330.			
Janab Abdur Rezak, B.A.	...	1942	150
Acharyya, Sri Bijankumar, M.A.	...	1944	250
Banerjee, Sri Bindukumar, B.Sc.	...	1946	120
Banerjee, Sri Niharranjan	...	1930	250
Banerjee, Sri Manmohan	...	1919	270
Banerjee, Sri Nandadulal, B.A.	...	1944	210
Basak, Sri Sachinandan, B.Sc.	...	1945	220
Basu, Sri Santikumar, B.Sc.	...	1945	220
Bhattacharyya, Sri Prabodhchandra, M.A.	...	1946	120
Bhowmick, Sri Debeschandra, B.A.	...	1952	100
Biswas, Sri Sarojranjan	...	1937	160
Chakrabarty, Sri Haripada, M.A.	...	1944	150
Chaudhuri, Sri Raghunath, B.Com.	...	1952	100
Chaudhuri, Sri Mahirprasun B.Com.	...	1952	100
Dasgupta, Sri Hariranjana, B.A.	...	1946	150
Datta, Sri Tejendralal, B.A.	...	1946	120
Ghosh, Sri Bagalapada	...	1926	250
Ma.tra, Sri Nemaichandra, B.A.	...	1947	120
Maulick, Sri Hrishikesh, M.A.	...	1945	150
Mitra, Sri Dwijendranath, B.A.	...	1939	220
Mookerjee, Sri Kalidas	...	1938	170
Mookerjee, Sri Manoranjan	...	1936	200
Mookerjee, Sri Prabaskumar	...	1938	160
Mookerjee, Sri Prabhatkumar	...	1939	130
Mookerjee, Sri Prabhatkumar, M.Sc....	...	1951	100
Pal, Sri Ajitkumar	...	1939	130
Raichaudhuri, Sri Mohitkumar, B.Sc.	...	1946	100
Rakshit, Sri Barindrakumar, B.A.	...	1945	210
Ray, Sri Akshaymohan, B.A.	...	1948	140
Roy, Sri Amarendranath, B.A.	...	1945	120
Roychaudhuri, Sri Dilipkumar, B.A.	...	1944	140
Roychaudhuri, Sri Jitendrakumar, B.A.	...	1944	120
Sarkar, Sri Anupam, B.A.	...	1952	100
Sen, Sri Seilendranarayan, B.Sc.	...	1954	220
Sengupta, Sri Aparaprasad, M.A.	...	1942	200
Sinha, Sri Hrishikesh, B.A.	...	1947	200

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
Grade—70-4-110-E.B.-5-180			
Banerjee, Sri Biswanath	1956	70	
Banerjee, Sri Binolkumar	1946	86	
Banerjee, Sri Debasprasad, II	1947	86	
Banerjee, Sri Iswarprasad	1952	70	
Chakrabarti, Sri Anilkumar	1956	70	
Chaki, Sri Pradipkanti, B.Com.	1953	78	
Chatterjee, Sri Kalinath, B.A.	1954	78	
Chatterjee, Sri Ramaprasad, B.Sc.	1954	78	
Chatterjee, Sri Sambhunath	1946	86	
Chaudhuri, Sri Chittaranjan	1946	74	
Chaudhuri, Sri Sudhirschandra	1947	74	
Chaudhuri, Sri Sureschandra, B.A.	1947	86	
Chaudhuri, Sri Anilkumar	1956	70	
Ganguli, Sri Rashbehari, B.A.	1951	86	
Ganguli, Sri Jitendranath	1956	70	
Ghosh, Sri Kartickchandra	1937	98+6 P.A	
Mukherjee, Sri Abhaynanda, M.A.	1952	78	
Mookerjee, Sri Sitanath	1956	70	
Nath, Sri Chandrakanta, B.A.	1953	78	
Raychaudhuri, Sri Sukumar	1952	70	
Sen, Sri Sunilkrishna, B.A.	1952	78	
Sinharay, Sri Chandrakanta	1954	74	

### 9. Engineering Establishment

#### ENGINEERS

Grade—500- $\frac{1}{2}$ -800+100 Car Allow.

Sri Sisirkumar Raychaudhuri, B.E., C.E., A M.I.E. (Ind.).	1952	600+100 Car Allow.
--	------	--------------------

Grade—100-10-210-E.B.-10-300-Sp.E.B.-15-330

Bose, Sri Hirendranath (Temp.)	...	1956	200
Bose, Sri Matilal (Draftsman)	...	1953	170
Goswami, Sri Sudhirschandra (Overseer)		1950	240

Grade—70-4-110-E.B.-5-180

Das Sri Dhananjay (Temporary)	1956	80
Niyogi, Sri Anantakumar (Electrician)	1952	98

### 10. Inspector of Colleges' Office

Grade—700- $\frac{1}{2}$ -1,000

Dr. Amarprasad Dasgupta, M.A., Ph.D., Inspector of Colleges	...	1930	1,000
--	-----	------	-------

100-10-210-E.B.-10-300-Sp.E.B.-15-330

Chatterjee, Sri Chunilal, M.A.	1927	300
Bhattacharyya, Sri Birendra Ch., B.A.	1937	220

Name	Grade Rs.	Year of first appointment	Present salary Rs
<b>11. Inspectorate of Hostels and Messes Staff</b>			
Mrs. Nirmala Sinha, M.A., Inspectress of Hostels and Halls.	250-15-400	1952	300 + 100 C.A.
Banerjee, Sri Kshetrajias	100-10-210-E.B.-10-300- Sp.E.B.-10-330	1924	
Chakrabarti, Sri Nagendranath	70-4-110-E.B.-5-180	1938	110
<b>12. Registrar's Department</b>			
REGISTRAR			
Grade—800-50-1000			
Dr. Dukhaharan Chakravarti, D.Sc., F.N.I.		1934	1,000
<b>SECRETARY ESTATES &amp; REORGANISATION</b>			
Grade—250-25-500			
Sri Sudhindrakrishna Dutt, M.A. (Oxon.), Barrister-at-Law. (up to 31-3-57 and Law Officer from 1-4-57 @ Rs. 350.		1939	500+100 P.A.
ASST. REGISTRAR			
GRADE—250-25-500			
Sri Jogeshchandra Mukherjee, B.A., B.T.		1945	325
OFFICE SUPERINTENDENT			
Grade—250-15-400			
Bhattacharyya, Sri Asutosh, B.A.	...	1921	370
P.A. to Vice-Chancellor			
Dutta, Sri Nalinichandra, B.A.	...	1954	320
ASSISTANTS			
Grade—100-10-210-E.B.-10-300-Sp.E.B.-15-330			
Bagchi, Sri Dwijendranath	...	1934	220
Banerjee, Sri Debiprasad, B.Sc.	...	1938	250
Banerjee, Sri Kshititosh, B.Com.	...	1952	220
Banerjee, Sri Prasfullachandra	...	1934	200
Banerjee, Sri Asitamohan up to 31-8-56	...	1918	280
Bera, Sri Kamalkrishna	...	1937	160
Bhattacharyya, Sri Brajendrachandra, M.A.	...	1940	150
Bhattacharyya, Sri Chintabaran	...	1950	110
Bhattacharyya, Sri Umapada	...	1937	110
Bhowmik, Sri Mohinimohan	...	1939	160

Name	Grade	Year of first appointment	Present salary
	Rs.		Rs.
Biswas, Sri Upendranath, B.A., B T.	...	1945	240
Bose, Sri Nripendranath, B.Sc.	...	1945	230
Bose, Sri Pareschandra	...	1924	250
Chakrabarti, Sri Brajendraprasanna, M.A.	...	1939	210
Chakrabarti, Sri Sunilchandra, M.A. (Double).	...	1944	230
Chatterjee, Sri Bijankumar B.A.	...	1944	140
Chatterjee, Sri Anilchandra	...	1936	140
Chaudhuri, Sri Janakinath	..	1944	170
Das, Sri Dharendrachandra	...	1937	110
Das, Sri Durlavchandra, B.A.	...	1928	240
Datta, Sri Jatindrachandra, B.A.	...	1934	315+40 P.A.
De, Sri Paroshchandra, M.A. (on leave)	...	1945	140
De, Sri Sankamohan, B.Com.	...	1943	100
De, Sri Kumudsankar, B.Com.	...	1945	100
De, Sri Taritkumar, B.A.	..	1952	100
Ghatak, Sri Amulyachandra	...	1934	240
Ghatak, Sri Biswanath, B.Sc.	..	1952	100
Ghosh, Sri Birendranath	...	1925	270
Ghosh, Sri Sachchidananda, B.Sc.	...	1952	100
Goswami, Sri Prafullachandra	...	1928	240
Goswami, Sri Amulyachandra, B.A.	...	1926	260
Guhathakurta, Sri Sisirkumar	...	1944	100
Maiti, Sri Amulyacharan	..	1944	110
Maitya, Sri Haripada	...	1946	110
Majumdar, Sri Saileschandra, B.A.	...	1940	150
Mitra, Sri Apitkumar, M.A., LL.B.	...	1944	210
Mookerjee, Sri Nitadrinath	...	1945	110
Mukherjee, Sri Bijalimohan, M.A., LL.B.	...	1937	300
Mukherjee, Sri Joydev, B.Com.	...	1952	100
Sengupta, Sri Harakali, B.Sc.	...	1945	240
Sil, Sri Narayanchandra	...	1956	100
Sukul, Sri Nirmalkanti, B.A.	..	1946	120

## Grade—70-4-110-E.B.-5-180

Banerjee, Sri Apitkumar, B.Sc.	..	1955	74
Banerjee, Sri Sachindranath, B.A., LL.B.	...	1954	78
Banerjee, Sri Satyananda	...	1955	70
Basak, Sri Bidyutkumar	...	1952	74
Bose, Sri Amarendrakumar	...	1944	90
Bose, Sri Jnanendranarayan	...	1944	90
Bose, Sri Kalosashu	...	1956	70
Bose, Sri Subodhchandra, B.A.	...	1953	78
Chakravarti, Sri Himansunarayan	...	1954	74
Chaudhuri, Sri Pranabkumar	...	1945	94
Chatterjee, Sri Binulchandra	..	1946	86
Chatterjee, Sri Kalisankar	...	1955	70
Chatterjee, Sri Prabodhkumar	...	1946	86
Chatterjee, Sri Prafullakumar, B.Com.	...	1952	86
Chatterjee, Sri Nirmalkumar, B.Sc.	...	1956	70
Chatterjee, Sri Dilipkumar, M.A.	...	1955	74

Name	Grade	Date of first appointment	Present salary
	Rs.		Rs.
Das, Sri Bibhutibhusan	...	1945	94
Dasgupta, Sri Pratip	...	1944	90
Dasgupta, Sri Sunilkumar	...	1952	70
Datta, Sri Phanindrachandra, M.A.	...	1952	78
De, Sri Panchugopal (Tel. Operator)	...	1922	160
De, Sri Santoshkumar	...	...	70
Ganguli, Sri Pradyotkumar, B.A.	...	1952	86
Ghosh, Sri Kiranmay, B.A.	...	1952	78
Ghosh, Sri Haridas	...	1952	78
Ghosh, Sri Jnanananda	...	1948	86
Ghosh, Sri Niharkumar	...	1942	86
Ghosh, Sri Phanibhusan	...	1943	90
Ghosh, Sri Radlaballav	...	1937	94
Ghosh, Sri Surendrakumar	...	1946	94
Goswami, Sri Kshirodebehari	...	1945	86
Goswami, Sri Gaurisankar, B.Com.	...	1952	78
Maumdar, Sri Jyoti-chandra, M.A., B.L.	...	1955	74
Mitra, Sri Debkumar, B.Sc.	...	1956	70
Mukherjee, Sri Binayendranarain, B.A.	...	1952	86
Nath, Sri Nalinikanta	...	1940	90+5 Allow.
Pal, Sri Jatindranath	...	1952	70
Pati, Sri Nakulchandra	...	1939	125
Raychaudhuri, Sri Asokkumar	...	1955	70
Raychaudhuri, Sri Jnanendrachandra, B.A.	...	1952	78
Roy, Sri Ardhendubikas	...	1945	86
Roy, Sri Purnendubikas	...	1944	70
Ray, Sri Bimanchandra, B.Sc.	...	1955	70
Roy, Sri Sauransu	...	1956	70
Sengupta, Sri Bibhutibhusan, B.Com.	...	1953	78

## STENOGRAPHERS AND REPORTERS

Grade—100-10 210-E B -10-300-Sp -E.B.-15 330

Ginba, Sri Aptkumar	1925	300
* Bhattacharyya, Sri Haripada, B.A. / ...	1954	250

## CARETAKER

Grade—100-10 210-E.B -10-300-Sp.-E.B.-15 330

* Makhoty, Sri Hiralal, B.A.	1936	220
------------------------------	------	-----

## 13. Post-Graduate Medical Studies

Grade—500-50/2-800

Mukherjee, Sri Prabhatkumar, M.Sc., M.B.B.S., Secretary.	1956	600
---	------	-----

Grade—70-4-110-E B -5-180

Dasgupta, Sri Anshkumar, Assistant	1957	70
------------------------------------	------	----

## 14 Sports Board

* D. K. Chowdhury, B.Sc., Jt. Secretary.	1951	300+30 C.A.
---	------	----------------











